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DEPARTMENT OF THE INTERIOR

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UNITED STATES

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No. 63

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1890

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UNITED STATES GEOLOGICAL SURVEY
J. W. POWELL, DIRECTOR

A BIBLIOGRAPHY

OF

PALEOZOIC CRUSTACEA

FROM

1698 to 1889

INCLUDING A LIST OF NORTH AMERICAN SPECIES AND A SYSTEMATIC ARRANGEMENT OF GENERA

BY

ANTHONY W. VOGDES

WASHINGTON
GOVERNMENT PRINTING OFFICE
1890

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF PALEOZOIC INVERTEBRATE PALEONTOLOGY,
Washington, D. C., May 1, 1890.

SIR: I have the honor to transmit herewith, for publication, a bibliography of Paleozoic Crustacea, prepared by Lieutenant A. W. Vogdes, U. S. A.

The bibliography bears internal evidence of long continued and extended research and its publication will supply a work of reference that has long been needed by the student of invertebrate Paleozoic fossils.

I remain, very respectfully,

CHAS. D. WALCOTT,
Paleontologist.

Hon. J. W. POWELL,
Director U. S. Geological Survey.

INTRODUCTION.

The sole object of this bulletin is to give a general view of the literature on the Paleozoic Crustacea and to aid students and paleontologists in their researches. It is the result of more or less constant work during the past ten years.

In its compilation I have examined almost every reference before recording it; those not so examined are indicated by a star (*) following the title.

For convenience, the subject-matter has been arranged as follows:

Part I. List of authors, including a brief index of the genera described in each work.

Part II. A catalogue of the North American Paleozoic trilobites.

Part III. The non-trilobitic Paleozoic Crustacea, with a list of the species.

I am well aware that the value of a work of this kind depends upon the care and labor given to its compilation. Every possible means of obtaining accurate information from a miscellaneous class of literature in many languages has been used, and it is hoped that there are but few errors and omissions.

I would thank those into whose hands this bulletin may fall for any information that would add to its value as a working hand-book.

A. W. VOGDES.

FORT HAMILTON, NEW YORK HARBOR, *April* 30, 1889.

PART I.

LIST OF AUTHORS.

AUTHOR'S EDITION

To Prof John C. Branner

Compliments of the author.

FORT CANBY, Pacific County, Washington, December 25th, 1890.

The proof-sheets of this Bulletin were read by Prof. U. P. JAMES, of the U. S. Geological Survey. The author notes the following additions and corrections, which are added in this supplement. He also invites criticisms upon the work and correspondence upon omissions, with notice of future publications.

To those who possess extra copies of the works marked in this bulletin, and are willing to part with them, he requests a statement of their price.

p. 16—**Barrois** (Charles). Faune du Calcaire d'Erbray (Loire Inférieure). Contribution a l'étude du terrain Devonien d l'ouest de la France. Lille, 1889., 346 pp., 17 plates.

Harpes, *Bronteus*, *Cheirurus*, *Cryphaeus*, *Phacops*, *Proetus*.

p. 17—**Beyrich** (Ernst). Ueber *Leaia leidyi*. In Zeitsch Deutsch. geol. Gessel. vol. 16. 1864 p. 363.

p. 19—**Bolsche** (W.) Ueber Prestwichia rontunda.

——— **Brogger**, 1878. Add to the note the genus *Conocephalus*.

p. 20—**Brogger** (W. C.) Om alderen af Olenelluszone i Nordamerika.

In Geol. Foreningens Stockholm Forhandl., vol. 8, 1886.

Contains important criticisms on American Primodial fossils.

——— **Brongniart** (Charles). Note sur un nouveau genre d'Entomostracé fossile provenant du terrains Carbonifere des environs de St. Etienne. In Annales Sci. Géol., vol. 6, 1876.

p. 21—**Burmeister**, 1843. Add the genus *Agnostus* to the note.

p. 22—**Clarke** (J. M.) The genus *Bronteus*. In 42d Rep. N. Y. State Mus., 1889. p. 403, fig. Author's edition 6 pp.

Bronteus senescens, n. s.

p. 22—**Clarke** (J. M. U.) As Trilobitas do Grez de Ereré e Maecurú Estado do Pará, Brazil.

In Archivos do Museu Nacional, Vol. 9, No. 1, 1889.

Dalmanites, *Phacops*, *Homalonotus*, *Cryphaeus*, *Ceraurus*.

p. 23—**Coignou** (Miss). On a new species of *Cyphaspis* from the Carboniferous rocks of Yorkshire.

In Quart. Jour. Geol. Soc. London, vol. 46, 1890, p. 421, 5 woodcuts.

p. 25—**D'Orbigny** (A.) Geologie du voyage dans l'Amerique meridonale Palaeontologie, Paris, 1842. 22 plates.

Calymene verneuili, n. s. pl. 1 figs. 4-5.

——— **Dawson** (J. W.) Description of *Pterygotus Canadensis* n. s.

In Canadian Naturalist, new series, vol. 9, 1881, p. 103, fig.

p. 27—**Eichwald**, 1863. In place of *Nileus*, *Bumastus* read *Illaenus*, *Actinobolus*

p. 29—**Faber** (Charles L.) Remarks on some fossils of the Cincinnati group.

In Jour. Cincinnati Soc. Nat. Hist., vol. 9. 1886, p. 14.

Lepidocoleus n. g. pl. 1 fig. 1 a-f.

p. 29—**Feistmantel.** Add to the note the genera *Beyrichia tuberculata*, *B. salteriana*, *Leperditia phaseolus*.

p. 29—**Foerste** (Aug. F.) Notes on Clinton group fossils, with special reference to collections from Indiana, Tennessee and Georgia.

In Proc. Boston Soc. Nat. Hist., vol. 24, 1889, p. 261.

Calymene Blumenba-chii, *var. Voydesi C. rostrata*, *Illaenus Ambiguus*, *Ill. Ioxus*, *Phacops pulchellus*, *Encrinurus punctatus*, *Lichas Boltoni*, *var. occidentalis* (?) *Cyphaspis Clintoni*, *Sp. nov.*

p. 30—**Geinitz** (H. B.) Ueber Thierfährten und Crustaceen-Reste in das unteren dyas, oder dem unteren Rothliegenden der Gegend von Hohenelbe.

In Isis, 1862, 2 plates.

Dalmanites, [?] *Kablikae*, *Kablikia dyadica*, *Branchiopus stagnalis*.

p. 35—**Hall and Clarke**, 1888. Read Hall (James) assisted by John M. Clarke.

p. 35—**Hall** (James). Report of the Director. In 42d Rep. N. Y. State Mus. 1889, p. 1 plate.

Crustacean tracks.

p. 36—**Harley** (J.) On the Ludlow bone bed and its crustacean remains.

In Quart. Jour. Geol. Soc., London, vol. 17, 1861, p. 542, plate 17.

Astacoderma n. g.

p. 37—**Haswell** (W.) Silurian formation of the Pentland hills, 1865.

Entomis impendens, n. s. p. 38 pl. 3 fig. 11.

p. 38—**Holm** (Gerhard). Die Ostbaltischen Illaeniden.

In Mem. Acad. Imp. Sci., St. Petersburg, 7th series, vol, 33, No. 8, 1886, 12 plates.

p. 41—**Jones** (T. Rupert). Third Report of the Committee consisting of Mr. E. Etheridge, Dr. H. Woodward and Prof. T. Rupert Jones (Secretary), on the Fossil Phyllopoda of the Palæozoic Rocks.

In Rep. 55th Meeting Brit. Assoc. Adv. Sci., 1885, p. 326

p. 42—**Jones** (T Rupert). Notes on the Palæozoic Bivalved Entomostraca, No. 27. On some North American (Canadian) species.

In Annals Mag. Nat. Hist., 6th series, vol. 3, 1889, plates 16-17.
Primitia. Beyrichia, Isochilina, Aparchites.

——— **& Kirby** (J. W.) On some Ostracoda from the Marou coal fields, Inverness Co. Cape Breton (Nova Scotia)
Geol. Mag. London dec. 3 vol. 6. 1889, p. 300.
Carbonia fabulina var. *altilis*, figs. 1-4.

——— **Jones** (T. Rupert). Notes on the Palæozoic Bivalved Entomostraca No. 28. On some Scandinavian species.
In Annals Mag. Nat. Hist., October, 1889, plate 15.
Macrocypris, Pontocypris, Bathocypris, Aparchites.

——— **& Woodward** (H.) On some new Devonian fossils.
In Geol. Mag. Dec. 3, vol. 6, 1889, p. 385. plate 11.
Echinocaris, Beyrichia.

——— **Jones** (T Rupert). On some Palæozoic Ostracoda from Pennsylvania.
In American Geologist vol. 4, 1889, p. 337, plate.
Primitia, Kloedenia, Bythocypris, Bollia, Leperditia.

——— On some Palæozoic Ostracoda from North America, Wales and Ireland.
In Quart. Jour. Geol. Soc., London, vol. 46, 1890. p. 1, plates 1-4.
Primitia, Primitiopsis, Entomis, Strepula, Æchmina, Bollia, Kloedenia, Beyrichia, Isochilina, Leperditia, Xestoleberis. Author's edition, 32 pp., 5 plates.

p. 42—**Jones** (T. Rupert). On some Devonian and Silurian Ostracoda from North America, France and the Bosphorus.
In Quart· Jour. Geol. Soc., vol. 46, 1890, p. 534, plates 20-21.
Bairdia, Beyrichia, Bollia, Bythocypris, Leperditia, Macrocypris, Moorea, Octonaria, Polycope, Primitia, Strepula, Urichia (n. g.)

——— **Jones** (T. Rupert). Seventh Report of the Committee on Fossil Phyllopoda of the Palæezoic rocks.
In Report 59th Meeting Brit. Assoc. Adv. Sci., 1889, p. 63.

p. 42—**Jordon** (H.) **& Bronn** (H. G.) On *Posidonomya tenella.*
In Neues Jahrb., 1850, p. 577.
Estheria tenella.

p. 43—**Kayser** (Emanuel). Ueber einige neue order wenig genannte Versteinerungen des rheinischen Devon.
In Zeitschr. Deutsch Geol. Gesell., vol. 41, 1889, p. 288.
Phacops.

——— **Keyserling** (Alex. G.) **Palaeontologische Bemerkungen 1. Reste der Transitionszeit.—IV. Crustacea. p. 288.**
Wissen. Beobachtungen auf einer Reise in das Petschora-land, Jahre 1843.
Cypridina marginata, Illaenus [Bumastus] barriensis, Phacops Odini, Encrinurus punctatus, Phillipsia Eichwaldi. P. truncatula.

p. 43—Kiesow. Add the genus *Homalonotus* to the note.

p. 44—Kloden. Add the genus *Calymene blumenbachii*, var. *tuberculosa* and *C. bellatula.*

p. 45—Kutorga, 1854. Read *Cheirurus Zembnitzkii* and *S. Enurus.*

——— **Lesley** (P. J.) A Dictionary of the Fossils of Pennsylvania and neighboring states named in the Reports and Catalogues of the Survey. Harrisburg, 1889–90. 3 vols.

This work contains brief descriptions of the Paleozoic Crustacea, with woodcut illustrations. The following new species are mentioned :
Homalonotus trentonensis, Simpson, p. 289,
Olenoides curticei, Walcott, p 492, figure.

p. 46—Linnarsson, 1877. Add the genus *Solenopleura* to the note.

p. 49—Martin (W.) The reference to the plates should read, plate 45 figs. 1-2, also pl. 45* fig. 1 (*Griffithides Seminifera*), erase reference to pl. 45* fig. 3.

p. 50—**Maurer** (F.) Der Kalk bei Greifenstein.
In Neues Jahrb, 1880.

p. 51—Meek, 1873. Add the genus *Bathyuriscus* n. g. to the note.

——————— 1877. Add the genus *Olenoides* n. g. to the note.

p. 52—**Matthew** (G. F.) How is the Cambrian divided? A plea for the classification of Salter and Hicks.
In American Geologist, vol. 4, p., 889, p. 139.

p. 54—**Munster** (G. G.) Verzeichniss der Versteinungen welche in der Kreis-Naturalien Sammlung zu Baireuth.
In Jahrb., 1836, p. 121.
Asaphus Nilesoni, Battus tricostatus, Calymene obscura.

p. 55—**M'Murtrie** (H.) Sketches of Louisville and the Fall of the Ohio. Louisville, 1819.

Somatrikelon megalomaton, p. 74 n. g. & n. s. This new genus under the law of priority should replace the genus *Phacops* if it were not for the objection to *Somatrikelon*, which means the same as the word Trilobite used for the class. The name given to the species "having very large eyes" corresponds to that given by Dr. Emmrich to the genus *Phacops*.

The author refers "this very curious animal to the vermes class," and remarks: "At first view it appears to have three distinct bodies and one head, which is owing to the former being very broad (nearly ½ an inch) and divided throughout its length by two deep clefts, one on each side of the central part or back, which is elevated a fourth of an inch above the sides, is convex, and terminated at one end by a large head, furnished with unusually prominent eyes and a mouth formed like that of a snapping turtle" * * * imbedded in a limestone from the Falls of the Ohio. The following diagnosis is given: "Corpus tripartium, rugosum, sinuatum; extremitate altera acuminata cur. vataque dorso, arcuato, serie tuberculorum utro, bique, capite subrotundo, oculis peramplis."

p. 55—**Novak** (Ottomar). Zur kenntniss der Fauna der Etage F-f 1 in der Palæozoischen Schichtengruppe bohmens.

In Sitzungberichte k. bohm Gesell. Wiss. Jahrg. 1886, plate.

Aristozoe solitaria, n. s.

p. 56—**Oehlert & Davoust.** Sur le Devonien du Department de la Sarthe.

In Bull Soc. Geol. France, 3d series, vol. 7, 1880–81, p. 693, plate 13.

——— **Oehlert** (D.) Sur la Dévonien des environs d'Angers.

In Bull Soc. Geol. France, 3d series, vol 17, 1880, p. 742, 3 plates.

Proetus, *Dechenella*, *Acidaspis*, *Phacops*, *Cryphaeus*, *Cryphina*, n.g. *Dalmanites* [*Probolin*], n., sub genus, *Goldius*, *Calymene*, *Axistozoe*.

p. 59—Richter, 1848. Add the note *Cytherina*, *Phacops*, *Asaphus*.

——— Roemer, 1854–66. Add the genus *Dalmania* and erase *Troehus*.

p. 60—Roemer, 1844. Read *lacinatus* for *acinatus*.

p. 61—**Safford** (J. M.) & **Vogdes** (A. W.) Description of new species of fossils. Crustacea from the Lower Silurian of Tennessee.

In Proc. Acad. Nat. Sci., Philadelphia, 1889, p. 166, 3 woodcuts.

Ampyx, *Encrinurus*, *Chamops*.

p. 65—**Schmidt**, 1886. Add the following genera: *Anomocare*, *Liostracus*, *Phacops*, [*Monorakos*], n., sub genus *Proetus*, [*Phaeton*], *Agnostus*, *Cyphaspis*, *Eurypterus*.

——————Revision der Ostbaltischen Silurischen Trilobiten.

In Mem. Acad. Imp. Sci., St. Petersburg, 7th series, vol. 33, 1885.

Acidaspis, *Lichas*—first group *Arges;* second group *Leiolichas;* third group *Platymetopus;* fourth group *Metopias;* fifth group *Hoplolichas;* sixth group *Conolichas;* seventh group *Homolichas;* ninth group *Oncholichas;* tenth group *Erganzungsgrouppe*.

p. 65—**Simpson** (G. B.). New species from Pennsylvania formations.

In Trans. Amer. Philos. Soc., 1889, p. 435.

Homalonotus Trentonensis, p. 460, fig. 31.

p. 67—**Smith** (J.) Notes on a collection of Bivalved Entomostraca and other microzoa from the Upper Silurian strata of the Shropshire district.

In Geol. Mag., London, Dec. 2, vol. 8, 1881, p. 70.

The author gives the method of collecting these small Entomostraca. List of species by Prof. T. Rupert Jones.

p. 67—Sternberg, 1833. Add to the note, p. 45, plate, and also the species *Tril. gracilis*.

p. 68—**Troost** (Gerhard). Description d'un nouveau genre de fossiles.

In Mem. Soc. Geol. France, vol 3, 1834, p. 87, plates 9, 10, 11.

The author describes a new species of *Asaphus* from the Upper Silurian of Perry County, Tennessee, as *Asaphus megalophthalmus*, p. 94, pl. 11, figs. 1–5, and an undescribed trilobite, pl. 11, figs. 6–7. The first is a *Phacops* approaching *P. Hudsoni*, Hall, the second a species of the genus *Dalmanites*.

p. 68—Trenkner. Add the genera *Phillipsia*, *Homalonotus* and *Cylinderocephalus*, erase *Entomis*.

p. 69—**Vogdes** (A. W.) A catalogue of North American Palaeozoic Crustacea, confined to the non-trilobitic genera and species.

In Annals N. Y. Acad, Sci., vol. 5, 1889, p. 1, 2 plates. *Strigocaris*, n. g.

p. 69—Volborth, 1847. Erase Eichw. The species was described by Dalman.

Verneuil (E.) Remarques sur les fossiles Paléozoique communs a l'Amerique et a l'Europe.

In Bull. Soc. Geol. Fr., 2nd series, vol. 4, p. 43.

p. 69—**Walcott** (C. D.) Descriptive notes on new genera and species, from the Lower Camberian or Olenellus zone of North America.

In Proc. U. S. Natl. Mus., vol. 12, 1889, p. 34.

Olenellus, *Olenellus* [*Mesonacis*] Solenopleura *Microdiscus* *Alvalonia*, n. g.

PART II.

In referring to certain new species of fossil crustacea described in the Palaeontology of New York, vol. 7, the author followed in his MSS. copy the synopical table of the genera and species given on pages 223–230 of that work.

The citations of this work should, therefore, appear under three different headings attributing to Prof. James Hall the species followed by his name, and to Prof. J. M. Clarke those recorded under his. The fossil crustaceans described by other authors, and noted in the work, should be cited under Hall & Clarke.

p. 89—Add **Agnostus desideratus,** Walcott, 1889; Proc. Natl. Mus., vol. 12, p. 39. Lower Cambrian.

p. 95—Under the genus **Atops** place the following synonyms :

Olenoides, Meek, 1877; U. S. Geol. Expl. 40 Par. Palæont. vol. 4, p. 45.

Dorypyge, Dames, 1884; China (Richthofen), vol. 4, p. 23.

Corynexochus; Angelin, 1854; Palæont. Scand., p. 59, pl. 33, fig. 11—not pl. 33, figs. 9 and 10.

p. 96—Add **Avalonia,** Walcott, 1889; Proc. Natl. Mus., vol. 12, p. 44.

——— **Manuelensis,** Walcott; Proc. Natl. Mus., vol. 12, p. 44. Lower Cambrian.

p. 99—**Bronteus senescens,** Clarke, 1889; 42nd Ann. Rep. N. Y. State Mus., p. 403, fig. Chemung.

p. 107—*Cyphaspis Clintoni*, Foerste, 1889; Proc. Boston Soc. Nat. Hist., vol. 24, p. 273, pl. 4, fig. 22.

p. 111—Under *Dal. Macroura ?* add Billings proposes the following classification of this variable species: *Dal. Macroura* [Swedish]; *D. affnis* [English]; **Dal Anticostientis** n. s. [Canadian].

p. 118—*Homalonotns Trentonensis*, Simpson, 1890; Trans. Amer. Philos. Soc., p. 460, fig. 31. Trenton.

p. 123—Erase the 8th line from the bottom.

p. 124—Add *Lonchocephalus Chippewaensis*, Owen; **Anomocare Chippewaensis.**

Dr. Owen in his report, Geol. Sur. Wis. Iowa and Minnesota, described four new genera of trilobites under the names of *Dikelocephalus*, *Lonchocephalus*, *Crepicephalus* and *Menocephalus*. The second genus is now classed as a synonym to *Anomocare* with *Anomocare Chippewaensis*, and *A. hamulus*, described in the report. There is a third species mentioned by Owen on p. 624, and also plate 1 a, fig. 15., Pygidium of *Lonchocephalus* (?) with long, slender, divergent caudal spines; also a similar pygidium, figured plate 1 a, fig. 13, as *Dikelocephalus* (?) *Lowensis*. Walcott, Bull U. S. Geol. Sur No. 10, p. 36, places the latter species under a subgenus to *Ptychoparia*, using Dr. Owen's *Crepicephalus* for it on account of the peculiar pygidium, overlooking, however, the fact that Owen has referred a similar pygidium directly to his genus Lonchocephalus on p. 624 of his report. Under the law of priority the genus *Ptychopaiia* replaces *Crepicephalus*, and the later name should be cancelled *in toto*, and not be retained in a modified sense. *Lonchocephalus* form an exception to this rule, if we divide the genus into two sections, retaining *Anomocare* for the two speciee described by Mr. Owen on p. 576. and *Lonchocephalus* for the species included by Walcott.

p. 125—Add **Microdiscus helena,** Walcott, 1889; Proc. Natl. Mus., vol. 12. p. 41. Lower Cambrian.

p. 126—For 34 read ¾, 36th line from top; line 39 read front for anteriorly.

p. 128—Add **Olenellus broggeni,** Walcott, 1889; Proc. Natl. Mus., vol. 12, p. 41. Lower Cambrian.

p. 129—*Olenoides Curtici*, Walcott, 1889, Dictionary of Fossils [Lesley] vol. 1, p. 482, fig. Middle Cambrian.

p. 132—Place above *Phacops rana*, *Sematriteium megalomaton*, McMurtrie, 1819; Sketches of Louisville, p. 74.

p. 137—*Proetus marginalis* [Hall], Walcott, 1884; add, this species is referred to **Proetus Nevadæ**, by Hall; Paleont. N. Y., vol. 7, p. 129.

Proetus Nevadæ, Hall, 1888; Paleont. N. Y., vol. 7, p. 129, pl. 23, fig. 19.

p. 138—Transfer line 27 from top to below *Calymene rowi*, Green, and erase *rowi*, opposite LeRow, 1837.

p. 139—transfer (*Dikelocephalus*) **Granulosus** below *Ptychaspis explanatus*. Syn. *Dikelocephalus miniscaensis*, Owen, should read (*Dikelocephalus*) **Miniscaensis**.

p. 147—Line 11 from bottom read Trenton for Utica.

——— Transfer the reference to *Brongniartia carcinodea*, Eaton, above **Triarthrus beckii**.

p. 146—Add **Solenopleura harveyi**, Walcott, 1889; Proc. Natl. Mus., vol. 12, p. 45. Lower Cambrian.

——— For syn. *robbi* read **robbi**.

——— 9th line from top, read Matthew for Whiteaves.

p. 152—CYPROCARIS, Barrande, 1872; Syst. Sil. Boheme, vol. 1, suppl. p. 460.

p. 158—**Bairdia Anticostiensis**, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 548, pl. 21, figs. 3, a-b. Hudson.

p 158—**Beyrichia diffissa**, idem. p. 546, pl. 21, fig. 7. Anticosti.

——— **Klœdeni**, idem. p. 538, pl. 21, figs. 1, a, b. Devonian.

——— **Kolmodeni**, idem. p. 538, pl. 21, fig. 6. Devonian.

——— **Subquadrata**, idem. p. 537, pl. 20, fig. 4. Devonian.

——— **howleyi**, Walcott, 1889; Proc. Natl. Mus., vol. 12, p. 45. Lower Cambrian.

p. 160—**Elymocaris capsella**, Hall, 1888; Palaeont. N. Y., vol. 7, p. 181, pl. 31, fig. 4. Chemung.

p. 161—**Bollia bilobata**, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 540, pl. 20, fig. 12. Devonian.

——— **Hindei**, idem. p. 540, pl. 20, fig. 5. Devonian.

——— **Semilunata**, idem. p. 548, pl. 21, figs. 9, a, b. Hudson.

Bythocypris Lindstrœmii, Jones, 1890; Quart. Jour. Geol. Soc. vol. 46, p. 548, pl. 21, figs. 11, a-c. Anticosti.

——— **Obtusa**, idem p. 549, pl. 21, figs. 4, a, b. Hudson

p. 170—**Leperditia frontalis**, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 547, pl. 21, figs. 8, a, b. Anticosti.

p. 172—**Macrocypris (?) Subcylindrica**, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 549, pl. 21, figs. 5, a, b. Anticosti.

p. 173—**Moorea Kirkbyi**, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 542, pl. 20, figs. 9, a, b; also figs. 10, a, b. Coniferous

Octonaria Linnarssoni, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 541, pl. 20, figs, 7, a, b. Hamilton

Polycope Sublenticularis, Jones, 1890; Quart. Jour. Geol. Soc., vol, 46, p. 550, pl. 21, figs. 6, a, b. Anticosti.

p. 174—**Premitia Billingsi**, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 547, pl. 21, fig. 10. Clinton or Niagara.

——— **Walcotti**, idem. p. 543, fig. 1.

p. 176—**Tropidocaris hamiltonensis**, Hall, 1888; Palaeont. N. Y., vol. 7, p. 227, pl. 30, figs. 24–25. Hamilton.

p. 176—**Strepula plantaris**, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 540, pl. 20, figs. 8, a, b. Devonian.

p. 177—**Ulrichia**, Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 543.

——— **Conradi**, idem. p. 543, fig. 2. Thedford, Ca

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A BIBLIOGRAPHY OF PALEOZOIC CRUSTACEA FROM 1698 TO 1889,

INCLUDING

A LIST OF NORTH AMERICAN SPECIES AND A SYSTEMATIC ARRANGEMENT OF GENERA.

By Anthony W. Vogdes.

PART I.

LIST OF AUTHORS.

A star (*) following a title indicates that the reference is recorded without opportunity for personal verification.

Agassiz (L.) Monographie des poissons fossiles du vieux grès rouge ou système dévonien (old Red Sandstone) des îles Britanniques et de Russie.

Text, Soleure; atlas, Neuchâtel, 1845, pp. xix-xx, note; and atlas, Tab. A.

Pterygotus n. g.

Alth (Alois von). Ueber die palæozoischen Gebilde Podoliens und deren Versteinerungen. Erste Abtheilung. *

In Abhandl. k. k. geol. Reichsanst., vol. 7, pt. 1, Wien, 1874, 5 pl.

Proetus, *Cyphaspis*, *Dalmania*, *Calymene*, *Ceraurus*, *Sphærexochus*, *Encrinurus*, *Illænus*, *Eurypterus*, *Pterygotus*, *Stylonurus*, *Beyrichia*, *Leperditia*, *Primitia*, *Bairdia*.

Alton (Ed. de). See **Burmeister** and **Alton**.

Ami (Henry M.) Notes on *Triarthrus spinosus* Billings.

In Trans. Ottawa Field Nat. Club, No. 4, 1882-'83, p. 88, 1 pl.

Angelin (N. P.) Palæontologia Scandinavica. Pars I. Crustacea formationis transitionis. Lipsiæ, 1854, 4to.

The first part of this work, entitled "Palæontologia Scandinavica," containing pp. 1-24 and pl. 1-24, was published by the Royal Swedish Academy of Sciences in 1852. The second portion in 1854, including a preface, pp. 1-9 and pp. 21-92, pl. 25-42.

The genera are arranged in the following order: *Olenus*, *Paradoxides*, *Cryptonynus*, *Eryx* n. g. (corrected by Angelin to *Elyx*, the generic term *Eryx* having been used by Stephen in 1832 for a genus of the Coleoptera), *Acontheus* n. g. (corrected by the author to that of *Aneucanthus*), *Agnostus*, *Phacops*, *Polytomurus*, *Remopleurides*, *Niobe* n. g., *Megalaspis* n. g., *Nileus*, *Ampyx*, *Proetus*, *Phæthonides* (Angelin uses this term for that of *Phæton* Barr.), *Forbesia*, *Goniopleura*, *Celmus* n. g., *Anomocare* n. g., *Solenopleura* n. g., *Liostracus* n. g., *Calymene*, *Homalonotus*, *Pliomera* (*Amphion*), *Cheirurus*, *Cyrtometopus* n. g., *Acidaspis*, *Trapelocera*, *Sphærexochus*, *Acidaspis*, *Rhodope* n. g. (this term was used by Siebold in 1848 for a genus of the Gasteropoda), *Dysplanus*, *Bumastus*, *Illænus*, *Æglina*, *Olenus*, *Peltura*, *Parabolina*, *Acerocare* n. g., *Leptoplastus* n. g., *Eurycare* n. g. (this genus is referred by J. W. Salter, Mem. Geol. Survey United Kingdom, Brit. Organic Remains, decade xi, pl. 8, p. 3, to the genus *Sphærophthalmus* Ang.), *Sphærophthalmus* n. g., *Anopocare* n. g. (this genus is referred by J. G. O. Linnarsson, Geol. Förening. Stockholm Förhdl., vol. 5, 1880-'81, p. 136, to the genera *Peltura* and *Sphærophthalmus*; the specimen, according to Dr. Linnarsson, in the Royal Museum of Sweden, "marked by Angelin as the *abdomen till Stenom. pusillus*, contains several small heads of *Sphærophthalmus alatus*, and a small pygidium of *Peltura scarabæoides*;" Dr. Linnarsson refers to this specimen as Angelin's type for the genus *Anopocare* and also remarks "that Angelin intended to change the family name of *Sphærophthalmus alatus* and their nearest forms to that of *Stenometopus*, inasmuch as another specimen of *Sph. alatus* has, in Angelin's own hand-

Angelin (N. P.)—Continued.

writing, the generic name of *Stenometopus*"), *Ptychopyge* n. g., *Asaphus*, *Bronteus*, *Holometopus* n. g., *Isocolus*, *Corynexochus* n. g., *Symphysurus*, *Kulpina* n. g., *Pharostoma*, *Conocoryphe*, *Trinucleus*, *Sphærexocoryphe* n. g., *Deiphon*, *Staurocephalus*, *Lichas*, *Dolichometopus* n. g., *Platymetopus*, *Cyrtometopus*, *Ampyx*, *Raphiophorus*, *Lonchodomas*, *Harpes*, *Arraphus* n. g., *Harpides*, *Centropleura* n. g. (J. G. O. Linnarsson, Svenska Vetensk. Akad. Handl., vol. 8, 1869, No. 2, p. 71, cites Angelin's *Centropleura angusticauda* and *C. dicræura* under Dr. Owen's genus *Dikelocephalus*), *Cybele*, *Telephus*, *Ogygia*, *Ogygiocaris* n. g.

—— Palæontologia Scandinavica. Pars I. Crustacea formationis transitionis fasciculi 1 et 2 cum tabulis 48. Holmiæ, 1878 (3d ed.).

This work contains plates 1, 1*a*, 2, 3, 20, 22, with an appendix, pp. 93–96. Emended and revised by Prof. Gustaf Lindström.

The appendix contains descriptions and figures of the following species: *Paradoxides tessini*, *P. tessini* var. *wahlenbergii*, *P. tessini* var. *œlandicus*, *P. affinis*, *P. tuberculatus*, *P. forchhammeri*, *P. tumidus*, *Centropleura loveni*, *C. steenstrupi*, *Ogygiocaris dilatata*, *O. dilatata* var. *sarsi*, *O. dilatata* var. *strömi*, in addition to the genera and species described in the second edition.

Anthony (J. G.) New Trilobites.

In Am. Jour. Sci., 1st series, vol. 34, 1838, p. 379.

Ceratocephala ceralepta, figs. 1 and 2.

—— Description of a new fossil (*Calymene bucklandii*).

In Am. Jour. Sci., 1st series, vol. 36, 1839, p. 106.

In this article a specimen of *Ceraurus pleurexanthemus* Green was figured and described under the name of *Calymene bucklandii* as a new species.

Audouin (J. V.) Recherches sur les rapports naturels qui existent entre les Trilobites et les animaux articulés.

In Annales Gén. Sc. Phys. Nat., Bruxelles, vol. 8, 1821, pl. 18, p. 233; also Isis (oder Encyc. Zeitung), Oken, vol. 1, 1822, p. 87.

Calymene blumenbachii.

Baily (W. H.) On two new species of Crustacea (*Belinurus* König) from the Coal Measures in Queen's County, Ireland; and some remarks on forms allied to them.

In Rept. 28th Meeting Brit. Assoc. Adv. Sci., 1858, p. 76.

—— On the annuloid Crustacea of the Coal Measures. (*)

In Jour. Geol. Soc. Dublin, vol. 8, 1858, p. 89. In this paper a description of a fossil Crustacean from the Bilboa Colliery, Queen's County, was given, with a few remarks on the allied species from Coal Brook Dale, which had been included with it in the genus *Limulus*, and it was proposed to remove all these Coal-Measure Crustacea from that genus and group them into a new one, under the name of *Steropis*.

—— Remarks on some Coal-Measure Crustacea belonging to the genus *Belinurus* König, with descriptions of two new species from Queen's County, Ireland. Pl. 5.

In Annals Nat. Hist., 3d series, vol. 2, 1863, p. 105. Translated by Milne-Edwards, Annales Gén. Sc. Phys. Nat., Bruxelles, 1863.

The author herein describes *Belinurus reginæ*, *B. arcuatus*, *B. bellulus*, *B. rotundus?*

Charles König in his work (Icones Fossilium Sectiles, London, 1825) simply mentions the name of *Belinurus bellulus* in his explanation of pl. 18, fig. 230.

—— Figures of characteristic British fossils, with descriptive remarks.

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—— On Trilobites and other fossils from Lower or Cambro-Silurian strata in the county of Clare. (*)

In Jour. Royal Geol. Soc. Ireland, vol. 17, pt. 1, 1886, p. 29.

Banks (R. W.) On the tilestones or Downton sandstones, in the neighborhood of Kington, and their contents.

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Pterygotus, *Pteraspis*, *Eurypterus*, *Himantopterus*.

Barrande (Joachim). Notice préliminaire sur le système silurien et les Trilobites de Bohême. Leipsic, 1846.

Étage C: *Paradoxides*, *Conocephalus*, *Ellipsocephalus*, *Arion* n. g., *Sao* n. g., *Baltus*, *Hydrocephalus* n. g., *Monadina* n. g.

Étage D: *Phacops*, *Calymene*, *Odontopleura*, *Asaphus*, *Cheirurus*, *Trinucleus*, *Caphyra* n. g., *Dione* n. g., *Illænus*, *Egle* n. g., *Battus*.

Étage E: *Phacops*, *Arethusa* n. g., *Sphærexochus*, *Asaphus*, *Cheirurus*, *Calymene*, *Staurocephalus* n. g., *Lichas*, *Harpes*, *Odontopleura*, *Cyphaspis*, *Bronteus*, *Phæton* n. g., *Proetus*,

Barrande (Joachim)—Continued.

Étage F: *Phacops*, *Bronteus*, *Lichas*, *Proetus*, *Harpes*, *Cheirurus*, *Odontopleura*, *Cyphaspis*.

Étage G: *Phacops*, *Bronteus*, *Cheirurus*, *Cyphaspis*, *Odontopleura*, *Proetus*.

—— Nouveaux Trilobites. Supplément à la Notice préliminaire sur le système silurien et les Trilobites de Bohême. Prague, 1846.

Étage C: Schistes fossilifères.

Étage D: *Cheirurus*, *Phacops*, *Ampyx*, *Odontopleura*, *Illænus*.

Étage E: *Arethusa*, *Harpes*.

Étage F: *Proetus*, *Phæton*, *Bronteus*, *Odontopleura*.

Étage G: *Harpes*, *Cheirurus*, *Phacops*.

—— Ueber das Hypostoma und Epistoma, zwei analoge aber verschiedene Organe der Trilobiten.

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The generic term *Dione* is herein modified to that of *Dionide*, p. 391.

—— *Sao hirsuta* Barrande, ein Bruchstück aus dem "Système silurien du centre de la Bohême."

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Sao.

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—— *Deiphon forbesii*, neuer Trilobit aus Böhmen.

In Ber. Mittheil. Freunde Naturw., Wien, vol. 5, 1850, p. 6.

—— Versuch einer Klassification der Trilobiten.

In Neues Jahrbuch für Mineral., 1850, p. 769.

—— Système silurien du centre de la Bohême. 1re partie. Recherches paléontologiques. Prague et Paris, 1852.

Vol. 1. Text, Crustacés, Trilobites. With atlas of 51 pls.

This classical work contains a historical sketch of all the genera of Trilobites, and descriptions of the following genera:

Harpes, *Remopleurides*, *Paradoxides*, *Hydrocephalus*, *Sao*, *Arionellus* n. g., *Ellipsocephalus*, *Olenus*, *Peltura*, *Triarthrus*, *Conocephalites*, *Proetus*, *Phillipsia*, *Griffithides*, *Cyphaspis*, *Arethusina* (generic term changed from that of *Arethus* to *Arethusina*), *Harpides*, *Phacops*, *Dalmanites*, *Calymene*, *Homalonotus*, *Lichas*, *Trinucleus*, *Ampyx*, *Dionide* (generic term changed from *Dione* to *Dionide*), *Asaphus*, *Ogygia*, *Æglina* n. g., *Illænus*, *Nileus*, *Symphysurus*, *Acidaspis*, *Cheirurus*, *Placoparia*, *Sphærexochus*, *Staurocephalus*, *Deiphon*, *Dindymene*, *Zethus*, *Amphion*, *Encrinurus*, *Cromus* n. g., *Bronteus*, *Agnostus*, *Telephus* n. g.

—— On *Ceratiocaris bohemicus*.

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? *Dicalocephalus*, etc.

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In Bull. Soc. Géol. France, 2d series, vol. 13, 1856, p. 532.

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Mere mention of locality and period.

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Arethusina sandbergeri-Barr.

—— Documents anciens et nouveaux sur la faune primordiale et le Système Taconique en Amérique.

In Bull. Soc. Géol. France, 2d series, vol. 18, 1861, pp. 203-321, pls. 4, 5.

Paradoxides asaphoides Emmons, *P. thompsoni* Hall, *P. macrocephalus* Emmons, *P. vermontana* Hall, *Peltura* (*Olenus*) *holopyga* Hall, *Atops trilineatus* Emmons, *A. punctatus* Emmons, *Triarthrus becki* Green, *Microdiscus quadricostatus* Emmons.

—— I. Réapparition du genera *Arethusina* Barrande. II. Faune silurienne des environs de Hof, en Bavière. Prague et Paris, 1868.

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—— Trilobites. I. Résumé général de nos études sur l'évolution des Trilobites. II. Distribution verticale des Trilobites dans le bassin silurien de la Bohême. III. Parallèle entre les Trilobites et Céphalopodes siluriens de la Bohême. IV. Épreuve des théories paléontologiques par la réalité. Prague et Paris, 1871.

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Barrande (Joachim)—Continued.
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Trilobites. *Harpes, Remopleurides, Paradoxides, Plutonia, Anopolenus, Dikelocephalus, Dolichometopus, Hydrocephalus, Olenus, Olenellus, Bohemilla, Conocephalites, Aneuacanthus, Angelina, Anomocare, Arionellus, Atops, Bathyurus, Chariocephalus, Corynexochus, Ellipsocephalus, Holocephalina, Ptychaspis, Sao, Triarthrus, Triarthrella, Proetus, Arethurina, Carmon* n. g., *Cyphaspis, Cyphoniscus, Harpides, Isocolus, Phillipsia, Phacops, Dalmanites, Calymene, Bavarilla, Homalonotus, Lichas, Trinucleus, Ampyx, Dionide, Endymionia, Microdiscus, Asaphus, Barrandia, Ogygia, Psilocephalus, Stygina, Æglina, Illænurus, Acidaspis, Cheirurus, Areia, Crotalurus, Deiphon, Placoparia, Sphærexochus, Staurocephalus, Zethus, Dindymene, Amphion, Cromus, Encrinurus, Bronteus, Illænus, Nileus, Agnostus, Illænopsis, Pemphigaspis, Shumardia, Telephus* n. g., *Triopus.*

Phyllopoda. *Ceratiocaris, Aptychopsis* n. g., *Cryptocaris* n. g., *Pterocaris* n. g.

Ostracodes. *Aristozoe* n. g., *Beyrichia, Bolbozoe* n. g., *Callizoe* n. g., *Caryon* n. g., *Crescentilla* n. g., *Cythere, Cytheropsis* n. g., *Elpe* n. g., *Entomis, Hippa* n. g., *Isochilina, Leperditia, Nothozoe* n. g., *Orozoe* n. g., *Primitia, Zonozoe* n. g.

Eurypteridæ. *Pterygotus, Eurypterus.*

Cirrhipediæ. *Anatifopsis* n. g., *Plumulites* n. g., *Bactropus* n. g., *Dryalus* n. g.

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—— and **Verneuil** (E. de). See **Verneuil** (E. de) and **Barrande** (Joachim).

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In Am. Jour. Sci., 3d series, vol. 15, 1878, p. 370.

Proetus pachydermatus n. s.

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—— On *Dalmanites dentata.*

In Am. Jour. Sci., 3d series, vol. 12, 1876, p. 70.

Barris (W. H.). New fossils from the Corniferous formation at Davenport.

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—— Thesaurus Siluricus. The flora and fauna of the Silurian period. London, 1868.

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Bathyurus, *Menocephalus*, *Amphion*.

Billings (E.)—Continued.

—— On some new or little-known species of Lower Silurian fossils from the Potsdam group (Primordial zone). Montreal, 1861, 24 pp.

This pamphlet, with the addition of a description of *Archæocyathus profundus*, the suppression of that of *A. minganensis*, and the notes on pages 10, 11, and 12, was reprinted in the "Palæozoic Fossils of Canada," vol. 1, 1865, pp. 1-24, also in part in the "Geol. Vermont," vol. 2, 1861, pp. 942-960.

Olenellus thompsoni Hall, *Olenellus vermontana* Hall, *Conocephalites miser* n. s., *C. adamsi* n. s., *C. teucer*, *C. vulcanus* n. s., *C. arenosus* n. s., *Bathyurus senectus* n. s., *B. parvulus* n. s., *Ampyx halli* n. s.

—— Description of a new species of *Harpes* from the Trenton limestone, Ottawa.

In Canadian Naturalist, vol. 8, 1863, p. 36, wood-cut.

Harpes dentoni n. s.

—— Geological Survey of Canada. Report of progress from its commencement to 1863. Illustrated by 498 wood-cuts in the text. Montreal, 1863. Atlas of maps and sections.

Harpes, *Paradoxides*, *Conocephalites*, *Triarthrus*, *Bathyurus*, *Proetus*, *Phacops*, *Dalmanites*, *Calymene*, *Lichas*, *Trinucleus*, *Asaphus*, *Illænus*, *Acidaspis*, *Cheirurus*, *Amphion*, *Encrinurus*, *Bronteus*, *Beyrichia*, *Leperditia*, *Isochilina*, *Eurypterus*, *Cytheropsis*.

—— Description of new species of *Phillipsia* from the Lower Carboniferous rocks of Nova Scotia.

In Canadian Naturalist, vol. 8, 1863, p. 209, 1 wood-cut.

Phillipsia howi.

—— Description of some new species of fossils, with remarks on others already known, from the Silurian and Devonian rocks of Maine.

In Proc. Portland Soc. Nat. Hist., vol. 1, 1869, p. 104, plate.

Dalmanites epicrates n. s., *Cheirurus tarquinius* n. s., *Proetus junius* n. s., *P. macrobius* n. s., *Bronteus pompilius* n. s., *Phacops trajanus* n. s., *Lichas*.

—— Palæozoic fossils. Vol. 1. Containing descriptions and figures of new or little known species of organic remains from the Silurian rocks. 1861-'65. 426 pp., 401 figures. Geol. Survey Canada.

The first portion of this work, consisting of 24 pages, was issued in November, 1861, and re-appears in this work, with the exception of the notes on pages 10, 11, and 12 of the original edition. The second part, consisting of pp. 25-56, was issued in January, 1862, and the third, pp. 57-168, in June, 1862; the fourth, pp. 109-344, in February, 1865.

Harpes, *Remopleurides*, *Olenus*, *Olenellus*, *Dolichometopus*, *Dikelocephalus*, *Telephus*, *Conocephalites*, *Arionellus*, *Bathyurus*, *Loganellus*, *Menocephalus*, *Triarthrus*, *Harpides*, *Lichas*, *Ampyx*, *Asaphus*, *Cheirurus*, *Sphærexochus*, *Amphion*, *Encrinurus*, *Illænus*, *Nileus*, *Agnostus*, *Beyrichia*, *Leperditia*, *Bathyurellus* n. g., *Shumardia* n. g., *Endymion* n. g. (this name was changed by the author to that of *Endymionia* on p. 281).

—— Catalogue of the Silurian fossils of the island of Anticosti, with descriptions of some new genera and species. 1866. 93 pp., 28 figs. Geol. Survey Canada.

Harpes, *Sphærocoryphe*, *Proetus*, *Dalmanites*, *Calymene*, *Lichas*, *Dionide*, *Asaphus*, *Cheirurus*, *Sphærexochus*, *Encrinurus*, *Bronteus*, *Illænus*, *Beyrichia*, *Leperditia*.

—— Note on some specimens of Lower Silurian Trilobites.

In Quart. Jour. Geol. Soc. London, vol. 26, 1870, p. 479, pls. 31, 32.

Asaphus platycephalus Stokes, with some of the legs preserved.

—— Palæozoic fossils. Vol. 2, pt. 1. 1874.

In Geol. Survey Canada, 144 pp., 85 figs. and 9 pls.

Paradoxides, *Anopolenus*, *Agraulos*, *Solenopleura*.

—— On some new or little known fossils from the Silurian and Devonian rocks of Canada.

In Canadian Naturalist, new series, vol. 7, 1874, p. 230.

Lichas superbus n. s.

Blumenbach (J. F.) Abbildungen naturhistorischer Gegenstände. Göttingen, 1810.

The author remarks on a species of *Calymene blumenbachii*, which he figures on pl. 50, that "according to all analogy it must have been without doubt the petrifaction of some species of insect without wings."

The specimen was from Dudley limestone and afterwards named by Alex. Brongniart *Calymene blumenbachii*.

Boeck (C.) Notitzer til Læren om Trilobiten. (*)

In Nyt Mag. Naturvid., vol. 1, Christiania, 1827, p. 11.

Trilobitern tesseni, *T. spinosus major*, *T. spinosus minor*, *T. gracilis*, *T. zippei*, *T. hausmanni*.

Noticed in Bull. Sci. Nat. (Férussac), vol. 14, 1828, p. 45.

Boeck (C.)—Continued.

—— Uebersicht der bisher in Norwegen gefundenen Formen der Trilobiten-Familie. (*)

In Gæa Norwegica (Keilhau), Christiania, 1838, pt. 1, p. 138.

Trilobiten elliptifrons, T. elegans, T. hausmanni, T. semilunaris, T. punctatus, T. sphæricus, T. clavifrons, T. blumenbachii, T. fischeri, T. forficula, T. acicularis, T. lyra, T. grandis, T. angustifrons, T. dilatatus, T. expansus, T. acuminatus, T. limbatus, T. striatus, T. frontalis, T. crassicauda, T. centrotus, T. asellus, T. alatus, T. latus, T. granulatus, T. rostratus, T. mammillatus, T. scarabæoides.

—— Om Trilobiten.

In Skand. Naturf. Förhand., vol. 2, 1840, p. 289; Neues Jahrbuch für Mineral., 1841, p. 724.

Boll (Ernst). Beitrag zur Kenntniss der Trilobiten.

In Dunker and von Meyer's Palæontographica, vol. 1, Cassell, 1847, p. 126.

Ampyx, Battus.

—— Ueber die Arten der Gattung *Beyrichia* in norddeutschen Silurian-Geröllen.

In Zeitschr. deutsch. geol. Gesell., Berlin, vol. 8, 1856, p. 321, 4 figs.

A communication from Herr Boll to Herr Beyrich.

Beyrichia jonesi, B. spinulosa, B. hians.

—— Die Beyrichien der norddeutschen silurischen Gerölle.

In Archiv Vereins Freunde Naturg. Mecklenburg, 1862, p. 114, pl. 1.

Beyrichia.

Born (*Chev.* de). Lithophilacion Bornianum. Index fossilium quæ collegit in class. ac ordinis digessit. 2 vols. Pragæ, 1772. (*)

In Crustacea, vol. 2, p. 5.

Bornemann (J. G.) Palæontologisches aus dem cambrischen Gebiete von Canalgrande in Sardinien.

In Zeitschr. deutsch. geol. Gesell., Berlin, 1883, p. 270.

Olenellus zoppei, Conocoryphe sp.? (*Olenus armatus* Meng.), *Illænus meneghini.*

Bradley (Frank). Description of a new Trilobite from the Potsdam sandstone, with a note by E. Billings, of Montreal, Canada.

In Proc. Am. Assoc. Adv. Sci., 14th meeting, 1861, p. 161, 3 wood-cuts.

Conocephalites minutus.

See, also, Am. Jour. Sci., 2d series, vol. 30, 1860, p. 241; Canadian Naturalist, vol. 5, 1860, p. 420.

Brady (M. P.) See **Jones** (T. Rupert), **Kirkby** (J. W.) and **Brady** (M. P.).

Brocchi (M. P.) Note sur un crustacé fossile recueilli dans les schistes d'Autun.

In Bull. Soc. Géol. France, 3d series, vol. 8, No. 1, 1880, p. 3, pl. 1.

Palæocaris, Gampsonyx, Nectotelson n. g.

Brodie (P. B.) History of fossil insects in the Secondary rocks of England. London, 1845, pp. 105–115, pl. 1, fig. 11.

This author describes and figures a fossil from Coalbrookdale resembling the caterpillar of the Emperor moth, which was afterwards described by J. W. Salter under the name of *Eurypterus* (*Arthropleura*) *ferox.*

Brögger (W. C.) Fossiler fra Oxna og Kletten. (*)

In Geol. Föreningens Stockholm Förhandl., vol. 2, 1875, 1 pl.

Paradoxides, Liostracus, Agnostus.

—— Andrumkalk ved Breidengen valders.

In Geol. Föreningens Stockholm Förhandl., vol. 3, 1876, 1 pl.

Paradoxides, Liostracus, Selenopleura, Agnostus.

—— Om Trondhjemsfeldtets midlere Afdeling mellem Guldalen og Meldalen Christiania. (*)

In Vidensk. Selskab. Förhandl., 1877, No. 2, p. 1, 2 pls.

Dalmanites, Trinucleus.

—— Om Paradoxides skifrene ved Krekling. (*)

In Nyt Mag. Naturvid., vol. 24, pt. 1, 1878, 6 pls.

Paradoxides, Olenellus, Dolichometopus, Liostracus, Conocoryphe, Anomocare, Elyx, Solenopleura, Ellipsocephalus, Arionellus, Agnostus.

—— Die silurischen Etagen 2 und 3 im Kristianiagebiet und auf Eker. Kristiania, 1882, 12 pls.

Remopleurides, Dicelocephalus, Olenus, Parabolina, Peltura, Cyclognathus, Ceratopyge, Ctenopyge, Protopleura (new subgenus to the genus *Peltura*), *Parabolinella* (new subgenus to the genus *Olenus*), *Leptoplastus, Sphærophthalmus, Eurycare, Bœckia* n. g., *Triarthrus, Euloma, Holometopus, Harpides, Phacops, Lichas, Trinucleus, Ampyx, Asaphus, Megalaspis, Symphysurus, Niobe, Ptychopyge, Nileus, Cheirurus, Illænus, Dysplanus, Amphion, Cybele, Agnostus, Conophrys, Beyrichia, Leperditia, Isochilina.*

—— *Paradoxides ölandicus* nivået ved Ringsaker, Norge. (*)

In Geol. Föreningens Stockholm. Förhandl., vol. 6, 1884, 1 pl.

Brögger (W. C.)—Continued.

—— Om aldern af Olenelluszonen i Nordamerika.

In Geol. Föreningens Stockholm Förhandl., vol. 8, 1886, p. 182.

—— Ueber die Ausbildung des Hypostomes bei einigen skandinavischen Asaphiden.

In Öfversigt Kongl. Svenska Vet.-Acad. Handl., vol. 11, 1886, 3 pls.

Asaphus, *Isotelus*, *Ptychopyge*, *Megalaspis*, *Megalaspides* n. g., *Niobe*, *Asaphellus*, *Ogygia*, *Nileus*, *Symphysurus*.

Bromell (M.) Lithographia Suecana.

In Acta Literaria Sueciæ, vol. 2, *Upsaliæ, 1725, p. 63.

This work was continued in several parts through this volume, but it is only at p. 493, in the section called "De lapidibus insectiferis Scanices et Gothicis," that the Trilobites are treated. We have there the *Oleni* of the alum slate and *Agnostus pisiformis*.

A separate edition of the work was printed at Stockholm and Leipzig, in 1740, bearing the same title as the original work.

Brongniart (Alex.) Histoire naturelle des Crustacés fossiles sous les rapports zoologique et géologique, savoir les Trilobites. Les Crustacés proprement dits par A.-G. Desmarest. 11 pls. Paris, 1822.

This author was the first systematic writer upon the Trilobites. He arranges twenty-two species under five new generic names, as follows: First genus, *Calymene*, species 1. *C. de Blumenbach*, 2. *C. de Tristan*, 3. *C.? variolaire*, 4. *C.? macrophtalme*. Second genus, *Asaphus*, species 1. *A.? cornigère*, 2. *A. de Debuch*, 4. *A. caudigère*, 5. *A. large queue*. Third genus, *Ogygia*, species 1. *O. de Guettard*, 2. *O. de Desmarest*. Fourth genus, *Paradoxides*, species 1. *P. de Tessin*, 2. *P. spinuleux*, 3. *P. scaraboïde*, 4. *P.? gibbeux*, 5. *P. lacinie*. Espèces de genre incertain: *Trilobite granulé*, *T. ponctué*, *T. bucéphale*, *T. tentaculé*. Fifth genus, *Agnostus*, species 1. *A. pisiforme*.

—— and **Desmarest** (A.-G.) Histoire naturelle des Trilobites et des Crustacés fossiles.

In Jour. Mines, vol. 9, 1822, p. 273.

Bronn (Heinrich). Ueber zwei neue Trilobiten-Arten.

In Zeitschr. für Mineral., vol. 1, pt. 1, 1825, p. 317, pl. 2.

Calymene latifrons, *C. schlotheimi*.

—— Geognostische zoologische Untersuchungen in den russisch-baltischen Provinzen von Herrn Dr. Eduard Eichwald.

In Zeitschr. für Mineral., vol. for 1828, pt. 1, p. 104.

Bronn (H. G.) Lethæa geognostica, oder Abbildungen und Beschreibungen der für die Gebirgs-Formationen bezeichnendsten Versteinerungen. Stuttgart, 1835–'38.

2 vols., and atlas with 47 pls.

—— and **Roemer** (F.) H. G. Bronn's Lethæa geognostica, oder Abbildungen und Beschreibungen der für die Gebirgs-Formationen bezeichnendsten Versteinerungen. 3d ed. Stuttgart, 1851–'56.

3 vols. and atlas, 124 pls.; vol. 1, p. 525.

Harpes, *Harpides*, *Remopleurides*, *Paradoxides*, *Hydrocephalus*, *Sao*, *Arionellus*, *Ellipsocephalus*, *Olenus*, *Conocephalites*, *Proetus*, *Cyphaspis*, *Phillipsia*, *Arethusina*, *Phacops*, *Dalmania*, *Cryphæus*, *Calymene*, *Homalonotus*, *Lichas*, *Trinucleus*, *Ampyx*, *Dionide*, *Asaphus*, *Ogygia*, *Æglina*, *Illænus*, *Acidaspis*, *Ceraurus*, *Placoparia*, *Sphærexochus*, *Staurocephalus*, *Deiphon*, *Dindymene*, *Zetheis*, *Amphion*, *Encrinurus*, *Cromus*, *Bronteus*, *Telephus*, *Agnostus*, *Eurypterus*, *Himantopterus*, *Pterygotus*, *Limulus*, *Gampsonychus*, *Cythere*, *Bairdia*, *Cypridina*, *Cyprella*, *Entomoconchus*, *Beyrichia*, *Dithyrocaris*, *Ceratiocaris*.

—— Note über die mit Homalonotus verwandten Trilobitengenera.

In Neues Jahrbuch für Mineral., 1840, p. 445, pl. 8, figs. 1 a, b.

—— Index palæontologicus, oder Uebersicht der bis jetzt bekannten fossilen Organismen, unter Mitwirkung der HH. H. R. Göppert und Herm. von Meyer bearbeitet von Dr. H. G. Bronn, Nomenclator palæontologicus in alphabetischer Ordnung. Stuttgart, 1848, 3 vols.

—— Ueber *Gampsonyx fimbriatus* Jordon aus der Steinkohlen-Formation von Saarbrücken und vom Murg-Thal.

In Neues Jahrbuch für Mineral., 1850, p. 575.

Brückmann (F. E.) Epistolarum itinerariarum centuria. Wolfenbüttelæ, 3 vols.

In Epist. 23, pl. 2, figs. 1–7, 1732, and Epist. 64, pl. 3, fig. 5, 1737.

This author compares the fossil Crustacea with the Mollusca and calls them *Armata veneris*.

Brunnich (M. T.) Beskrivelse over Trilobiten, en Dyrestagt og dens Arter, med en ny Aftegning.

In Nye Samling of det Kongelige Danske Videnskabers Selskabs Skriften, Kiöbenhavn. 1781, p. 384, 1 pl.

This author describes *Trilobus* (*Calymene*) *tuberculatus*, *Trilobus* (*Dalmanites*) *caudatus* (figures of head and pygidium), *Trilobus dilatatus*, *Trilobus* (*Encrinurus*) *punctatus*

Buch (Leopold von). Beiträge zur Bestimmung der Gebirgs-Formationen in Russland.

In Archiv mineral. Geogn., etc., vol. 15, Berlin, 1841, p. 1, pl. 2.

Phacops, *Calymene*, *Asaphus*, *Illænus*.

Buckland (William). Geology and mineralogy considered with reference to natural theology. Bridgewater treatise. 2 vols. London, 1837, 87 pls. [4th ed., London, 1869, 2 vols., 90 pls.]

Translated into German by L. Agassiz.

Paradoxides, *Phillipsia*, *Phacops*, *Calymene*, *Asaphus*, *Ogygia*, *Encrinurus*, *Limulus* (*Belinurus*) *trilobitoides*.

Burmeister (H.) Die Organisation der Trilobiten, etc. Berlin, 1843, 6 pls.

The English translation is entitled: "The organization of Trilobites deduced from their living affinities, with a systematic review of the species hitherto described, by Hermann Burmeister, edited from the German by Prof. Thomas Bell, F. R. S., and Prof. E. F. Forbes, F. R. S." London, Ray Society, 1846. There is a supplementary appendix by the editors.

Burmeister classifies 63 species under 23 genera arranged in the following order:

Eurypterus, *Cytherina*, *Trinucleus*, *Ogygia*, *Odontopleura*, *Arges*, *Bronteus*, *Paradoxides*, *Olenus*, *Conocephalus*, *Ellipsocephalus*, *Harpes*, *Calymene*, *Homalonotus*, *Phacops*, *Cyphaspis* n. g., *Proetus*, *Æonia* n. g., *Archegonus* n. g., *Illænus*, *Dysplanus* n. g., *Asaphus*, *Ampyx*.

The supplementary appendix by Thomas Bell and E. F. Forbes contains an alphabetical list of British Trilobites, also a copy of McCoy's generic description of the following genera: *Tiresia*, *Forbesia*, *Portlockia*, *Trinodus* (Synopsis Silurian Fossils Ireland, 1846); the generic descriptions of *Cheirurus*, *Sphærexochus*, *Lichas*, *Trochurus* (Beyrich, Ueber einige böhmische Trilobiten, 1845), and a list of the genera and species described by Barrande (Notice préliminaire sur le système silurien et les Trilobites de Bohême, 1846).

—— and **Alton** (Ed. de). Neue Beobachtungen über die Organisation der Trilobiten. (*)

In Zeitung für Zoologie, Zootomie und Palæozoologie, Alton und Burmeister, Leipzig, vol. 1, 1848, p. 67, pl. 1, figs. 13–19.

Callaway (Charles). On a new area of Upper Cambrian rocks in South Shropshire, with a description of a new fauna.

In Quart. Jour. Geol. Soc. London, vol. 33, 1877, p. 652, plate.

Olenus, *Conocoryphe*, *Asaphus*, *Asaphellus* (new subgenus), *Platypeltes* (new subgenus), *Lichapyge* n. g., *Agnostus*, *Conophrys* n. g.

Castelnau (Laport de). Communique à l'Académie des sciences de Paris la découverte des pieds des Trilobites qu'il aurait vus dans l'intérieur d'un exemplaire enroulé de l'Amérique du Nord.

In Inst. France, 1842, p. 74; Neues Jahrbuch für Mineral., 1843, p. 504; Comptes Rendus, vol. 14, 1842, p. 944.

Calymene.

—— Essai sur le système silurien de l'Amérique Septentrionale. Paris, 1843, 27 pls.

Asaphus micrurus, *A. limulurus*, *A. cordieri*, *A. caudatus*, *A. edwardii*, *A. murchisoni*, *Homalonotus giganteus*, *H. herculaneus*, *H. atlas*, *Arctinurus* n. g., *A. boltoni*, *Calymene bufo*, *Odontocephalus*, *Acantholoma*, *Aspidolites*, *Discranurus*.

Champernowne (A.) Note on a find of *Homalonotus* in Red Beds at Torquay.

In Geol. Mag., new series, decade 2, vol. 8, 1881, p. 487.

Chapman (E. J.) *Asaphus canadensis*.

In Canadian Jour., new series, vol. 1, 1856, p. 482.

—— A review of the Trilobites, their characters and classification.

In Canadian Jour., new series, vol. 1, 1856, p. 271, wood-cuts.

—— *Trinucleus concentricus*.

In Canadian Jour., new series, vol. 3, 1858, p. 414, wood-cut.

—— On some new Trilobites from Canadian rocks.

In Annals Mag. Nat. Hist., 3d series, vol. 2, 1858, p. 9, 2 figs.

Asaphus canadensis, *A. halli*.

—— On some new Trilobites from Canadian rocks.

In Canadian Jour., new series, vol. 3, 1858, p. 230, 2 wood-cuts.

Asaphus canadensis, *A. halli*.

—— On the hypostoma of *Asaphus canadensis* and on a third new species of Asaphus from the Canadian rocks.

In Canadian Jour., new series, vol. 4, 1859, p. 1, 2 figs.

Asaphus canadensis, *A. hincksii*.

—— On the probable nature of the supposed fossil tracks known as *Protichnites*, etc.

In Canadian Jour., new series, vol. 16, 1877, p. 7.

Clarke (J. M.) New Phyllopod Crustaceans from the Devonian of western New York.

In Am. Jour. Sci., 3d series, vol. 23, 1882, p. 476, plate.

Estheria, *Spathiocaris* n. g., *Lisgocaris* n. g.

Clarke (J. M.)—Continued.

—— Cirriped Crustacean from the Devonian.

In Am. Jour. Sci., 3d series, vol. 24, 1882, p. 55.

Plumulites devonicus.

—— New discoveries in Devonian Crustacea.

In Am. Jour. Sci., 3d series, vol. 25, 1883, p. 120.

Dipterocaris n. g.

—— Ueber deutsche oberdevonische Crustaceen (hierzu) Tafel 4.

In Neues Jahrbuch für Mineral., 1884, pt. 1, p. 178.

Spathiocaris, *Entomis*, *Dithyrocaris.*

—— On the higher Devonian fauna of Ontario County New York.

In Bull. U. S. Geol. Survey, No. 16, 1885, 3 pls.

Ceratiocaris, *Beyrichia*, *Echinocaris*, *Spathiocaris.*

—— The structure and development of the visual area in the Trilobite *Phacops rana* Green

In Jour. Morphology, vol. 2, No. 2, Nov., 1888, Boston, p. 253, pl. 21.

Clarke (W. B.) On the occurrence of Trilobites in New South Wales.

In Quart. Jour. Geol. Soc. London. vol. 4, 1848, p. 63 (not descriptive).

Claypole (E. W.) Note on a large Crustacean from the Catskill group of Pennsylvania.

In Proc. Am. Philos. Soc., Phila., vol. 21, 1883, p. 236, plate.

Dolichocephala n. g.

On the occurrence of the genus *Dalmanites* in the Lower Carboniferous rocks of Ohio.

In Geol. Mag., decade 3, vol. 1, London, 1884, p. 303.

Dalmanites? cuyahogœ.

Conrad (T A. Report on the Palæontological Department.

In Rept. Geol. Survey New York, 1838, p. 107.

Platynotus n. g.

—— On the Silurian system; with a table of the strata and characteristic fossils.

In Am. Jour. Sci., 1st series, vol. 38, 1840, p. 86.

—— Third Annual Report on the Palæontological Department of the Survey.

In Rept. Geol. Survey New York, 1840, p. 199.

Odontocephalus n. g., *Acanthaloma* n. g., *Odontocephalus selenurus*, *Asaphus halli*, *Acidaspis tuberculatus.*

Description of new genera and species of organic remains. Crustacea.

In Rept. Geol. Survey New York, 1841, p. 48, 1 pl.

Conrad (T. A.)—Continued.

Aspidolites n. g., *Dicranurus* n. g., *Asaphus? acantholeurus*, *A. denticulatus*, *A. nasutus*, *A. aspectans*, *Calymene senaria.*

The plate accompanying this report was distributed with a few copies. Republished in the 15th Rept. New York State Cab. Nat. Hist., pl. 11.

—— *Cytherina alta.*

In Geol. Survey New York, pt. 3, comprising the survey of the 3d Geol. Dist. (Vanuxem), 1842, p. 112, fig. 23, No. 6.

—— Observations on the Silurian and Devonian systems of the United States, with descriptions of new organic remains.

In Jour. Acad. Nat. Sci., Phila., vol. 8, 1842, p. 228, 6 pls.

Asaphus corycœus, *A.? trentonensis*, *Calymene spinifera*, *C. camerata*, *Dipleura.*

—— Observations on the lead-bearing limestone of Wisconsin, and descriptions of a new genus of Trilobites and fifteen new Silurian fossils.

In Proc. Acad. Nat. Sci. Phila., vol. 1, 1843, p. 329.

Thaleops n. g.

Corda (A. J. C.) and **Hawle (Ignaz).** Prodrom einer Monographie der böhmischen Trilobiten

In Abhandl. böhm. Gesell. Wiss., Prag, vol. 5, 1847, pp. 129–292, pls.

This work is generally attributed to A. J. C. Corda. The 58 new genera described in this work are arranged by Joachim Barrande, Système silurien du centre de la Bohême, vol. 1, p. 39, as follows:

I. DIVISION. TELEJURIDES.

1. Phbysacium	= Hydrocephalus Barr.
2. Phanoptes	
3. Crithias	= Sao Barr.
4. Tetracnemis	
5. Goniacanthus	
6. Enneacnemis	
7. Acanthocnemis	
8. Acanthogramma	
9. Endogramma	
10. Micropyge	
11. Selenosema	
12. Staurogmus	
13. Herse	= Arionellus Barr.
14. Agraulos	
15. Conocoryphe	= Conocephalus Zenk.
16. Ptychoparia	
17. Ctenocephalus	
18. Selenopeltis	= Acidaspis Murch.
19. Polytomurus	Dionide Barr.
20. Tetrapsellium	= Trinucleus Lhwyd.
21. Phalacroma	= Agnostus (in part) Brong.
22. Selenoptychus	= Æglina Barr.
23. Mesospheniscus	= Agnostus integer Beyr.
24. Diplorrhina	= Agnostus integer.

Corda (A. J. C.) and Hawle (Ignaz)—Continued.

I. DIVISION. TELEJURIDES—Cont'd.

25. Condylopyge } = Agnostus rex Barr.
26. Lejopyge }
27. Microparia = Æglina Barr.
28. Plæsiacomia = Illænus Dalm.
29. Cyclopyge = Æglina (in part) Barr.
30. Alceste = Illænus (in part) Dalm.
31. Xiphogonium = Proetus Stein.
32. Conoparia = Cyphaspis Burm.
33. Goniopleura = Proetus elegantulus Ang.
34. Aulacopleura = Arethusina Barr.
35. Pharostoma = Calymene Brong.
36. Atractopyge } = Dalmania (in part) Emmrich.
37. Odontochile }

(This generic term was used in 1834 for a genus of the Coleoptera).

II. DIVISION. ODONTURIDES.

38. Amphytrion = Remopleurides Portlock.
39. Arthrorhachis = Agnostus tardus Barr.
40. Peronopsis = Agnostus integer Beyr.
41. Battus = Agnostus integer.
42. Pleuroctenium = Agnostus granulatus Barr.
43. Thysanopeltis = Bronteus (in part) Gold.
44. Dindymene = Dindymene Corda.
45. Prionopeltis = { Proetus (in part) Stein. / Phætonides Barr. }
46. Asteropyge } = Dalmania (in part) Dalm.
47. Metacanthus }
48. Odontopyge = Olenus spinulosus.
49. Placoparia = Placoparia Corda.
50. Eccoptochile = Cheirurus Beyr.
51. Actinopeltis = Cheirurus Beyr.
52. Trochurus = Staurocephalus Barr.
53. Corydocephalus }
54. Dicranopeltis } = Lichas Dalm.
55. Acanthopyge }
56. Dicranogmus }
57. Trapelocera = Acidaspis Murch.
58. Ceratopyge = Olenus forficula Sars.

Cozzens (Issachar). Description of three new fossils from the Falls of the Ohio.

In Annals Lyceum Nat. Hist. New York, vol. 4, 1846, p. 157, 1 pl.

Piliolites n. g.

The author therein describes a species of *Proetus* under the name of *Piliolites ohioensis*.

Da Costa (E. M.) A letter concerning the fossil from Dudley.

In Philos. Trans. Royal Soc., vol. 48, pt. 1, No. 42, 1753, p. 286, pl. 1, figs. 6-8.

Dr. Da Costa herein gives the name of *Pediculus marimus major trilobus* to the then called Dudley fossils (*Calymene blumenbachii*), and declares it to be a crustaceous animal nearly related to the living *Isopodes*.

—— Description of a curious fossil animal.

In Gentleman's Mag., vol. 25, London, 1754, p. 24, pl. —, fig. 3.

Calymene blumenbachii.

Dalman (J. W.) Några petrificater fundne i Ostergötlands ofvergangskalk afterknade och beskrifne.

In Svenska Vetensk. Akad. Handl., 1824, p. 368, pl. 4.

Entomostr. actinurus.

—— Om Palæaderna eller de sa kallåde Trilobiterna. Stockholm, 1826, 6 pls.

Svenska Vetensk. Akad. Handl., 1826, p. 226.

The German translation bears the following title: Ueber die Palæaden, oder die sogenannten Trilobiten von J.D. Dalman, von Friedrich Engelhart, mit 6 Kupfertafeln, Nürnberg, 1828.

Dalman arranges 41 species of Trilobites under 5 genera and 4 subgenera, as follows:

Division I. Oculated: 1st genus, *Calymene*; 2d genus, *Asaphus*.

Division II. Typhlini: 3d genus, *Ogygia*; 4th genus, *Olenus* (*Paradoxides* Br.). Section 2. Battoides: 5th genus, *Battus* (*Agnòstus* Br.).

Subgenera: 1. *Asaphus* (*Nileus*); 2. *Asaphus* (*Illænus*); 3. *Asaphus* (*Ampyx*); 4. *Lichas* n. g.

—— Årsberättelse om nyare zoologiska arbeten och upptäckter.

This work forms a part of the annual report of the keepers of the Swedish State Museum for 1828. It contains (p. 134), under the title of "Nya Svenska Palæades" a description of the following Trilobites: *Calymene ornata*, *C. verrucosa*, *C. clavifrons*, *C.? centrina*, *Asaphus heros*, *A. platynotus*, *Nileus glomerinus*, *Ampyx pachyrrhinus*, *Battus lævigatus*, *B. pisiformis*.

—— Nouvelles espèces de Trilobites ou Palæades de Suède.

In Bull. Férussac, vol. 19, 1828, p. 129.

A notice of the preceding reference.

Dames (W.) Ueber *Hoplolichas* und *Conolichas*, zwei Untergattungen von *Lichas*.

In Zeitschr. Deutsch. geol. Gesell., Berlin, 1877, vol. 29, pt. 1, p. 793, 3 pls.

The type used for the new genus *Hoplolichas* is *Lichas tricuspidatus* Boll, and for *Conolichas*, *Lichas æquiloba* Steinh.

—— Geologische Reisenotizen aus Schweden.

In Zeitschr. Deutsch. geol. Gesell., Berlin, 1881, vol. 33, p. 405.

Paradoxides ælandicus, *P. tessini*, *P. forchhammeri*, *P. kjerulfi*, *Ellipsocephalus*, *Lichas*, *Megalaspis*, *Asaphus ?*, *Agnostus*.

—— Erste Abhandlung. Cambrische Trilobiten von Liau Tung, China (Richthofen). Vol. 4. Berlin. 1883, pls. 1, 2.

The author suggests the new generic term *Dorypyge* for certain Trilobites which have the pygidium armed with strong spines, the penultimate pair being the longest, including in the genus *Dikelocephalus quadriceps* Hall and Whitfield and *D. gothicus* Hall and Whitfield.

Dames (W.)—Continued.

Under *Anomocare* Angelin he includes the following American species: *Conocephalites hamulus* Owen, *C. wisconsinensis* Owen, and *C. pattersoni* Hall.

Conocephalites frequens, *C. quadriceps*, *C. typus*, *C. subquadratus*, *Anomocare latelimbatum*, *A. minus*, *A. planum*, *A. nanum*, *A. majus*, *A. subcostatum*, *Liostracus talingensis*, *L. megalurus*, *Dorypyge* n. g., *D. richthofeni*, *Agnostus chinen.*

—— E. W. Claypole: On the occurrence of the genus Dalmanites in the Lower Carboniferous rocks of Ohio. Geol. Mag. London, 1884.

In Neues Jahrbuch für Mineral., 1885, vol. 1, p. 102 (abstract).

Dalmanites, *Phillipsia*, *Proetus*.

—— C. D. Walcott: Appendages of the Trilobites. Science, vol. 3. 1884, p. 279.

In Neues Jahrbuch für Mineral., vol. 1, p. 102 (abstract).

Asaphus, *Calymene*, *Ceraurus*.

—— T. R. Jones and J. W. Kirkby: On some Carboniferous Entomostraca from Nova Scotia. Geol. Mag. London, 1884.

In Neues Jahrbuch für Mineral., vol. 1, 1885, p. 106 (abstract).

Leperditia, *Beyrichia*.

—— T. R. Jones and H. Woodward: Notes on Phyllopdiform Crustacea, referable to the genus *Echinocaris* from the Palæozoic rocks. Geol. Mag. London, 1884.

In Neues Jahrbuch für Mineral., vol. 1, 1884, p. 110 (abstract).

—— Chas. E. Beecher: Ceratiocaridæ from the Chemung and Waverly group of Warren County. Second Geol. Survey, Penn. Rept. PPP.

In Neues Jahrbuch für Mineral., vol. 1, 1884, p. 110 (abstract).

—— J. Mickleborough: Locomotory appendages of Trilobites. Geol. Mag. London, 1884.

In Neues Jahrbuch für Mineral., 1885, p. 477.

—— F. Schmidt and T. R. Jones: On some Silurian *Leperditia*. Annals Nat. Hist., series 5, vol. 9, 1882, p. 168.

In Neues Jahrbuch für Mineral., 1885, vol. 1, p. 105 (abstract).

Dana (James D.) Trilobites in the Potsdam sandstone.

In Edinburgh New Philos. Jour., vol. 6, 1857, p. 350.

—— On the supposed legs of Trilobites (*Asaphus platycephalus*).

In Annals Nat. Hist., 4th series, vol. 7, London, 1871, p. 366; Am. Jour. Sc., 3d series, vol. 1, 1871, p. 320.

Dana (James D.)—Continued.

—— Manual of geology, treating of the principles of the science with special reference to American geological history. 2d ed. New York, 1874, p. 174.

D'Archiac (A.) and **Verneuil** (E. de). On the fossils of the older deposits in the Rhenish Provinces, preceded by a general survey of the fauna of the Palæozoic rocks, and followed by a tabulated list of the fossils of the Devonian system of Europe.

In Bull. Soc. Géol. France, vol. 13, 1841-'42; Trans. Geol. Soc. Lond., vol. 6, pt. 2, 1842, p. 303.

——, **Fischer** (de Waldheim G.) and **Verneuil** (E. de). Paléontologie de l'Asie Mineure. Paris, 1866, atlas, 21 pls. (*)

Dawson (J. W.) On the Lower Coal Measures as developed in British America.

In Quart. Jour. Geol. Soc. London, vol. 15, 1859, p. 62.

Tracks of a Crustacean.

—— Note on the fossils of Nova Scotia.

In Canadian Naturalist, vol. 5, 1860. p. 297 (wrongly paged 197 in the volume).

Homalonotus dawsoni Hall.

—— On the foot prints of *Limulus* as compared with the *Protichnites* of the Potsdam sandstone.

In Canadian Naturalist, vol. 7, 1862, p. 271 Am. Jour. Sci., 2d series, vol. 34, 1862, p. 416.

—— Acadian geology. The geological structure, organic remains, and mineral resources of Nova Scotia, New Brunswick, and Prince Edward Island, etc. London.

Three editions, 1855-'78 (3d ed. contains the supplement to the 2d ed.).

Paradoxides, *Conocephalites*, *Phillipsia*, *Dalmanites*, *Agnostus*, *Microdiscus*.

Mr. C. F. Hartt's descriptions of the trilobites first appeared in the third edition of this work. The original MSS. described *Microdiscus dawsoni* under the new generic name of *Dawsonia*, but on Prof. E. Billings's authority the author has referred it to *Microdiscus dawsoni.*

Eurypterus, *Estheria*, *Leaia*, *Beyrichia*, *Leperditia*, *Cythere*, *Diplostylus*.

—— Supplement to the 2d edition of Acadian geology. Containing additional facts as to the geological structure, fossil remains, and mineral resources of Nova Scotia, New Brunswick, and Prince Edward Island. London, 1878.

Dawson (J. W.)—Continued.

Homalonotus dawsoni, *Protichnites carbonarius*, *Anthracopalæmon* (*Palæocarbus*) *hillianum*.

—— Note on two Palæozoic Crustaceans from Nova Scotia.

In Geol. Mag., decade 2, vol. 4, London, 1877, p. 56. (See, also, Supplement Acadian Geol., 1878, p. 55, fig. 10.)

Anthracopalæmon (*Palæocarabus*) *hillianum*, *Homalonotus dawsoni*.

Day (F. H.) On the fauna of the Niagara and Upper Silurian rocks as exhibited in Milwaukee County, Wisconsin, and in counties contiguous thereto.

In Trans. Wisconsin Acad. Sc., vol. 4, 1876–'77, p. 113.

Dekay (J. E.) Observations on the structure of Trilobites, and description of an apparently new genus; with notes on the geology of Trenton Falls, by James Renwick. Read Nov. 22 (1824).

In Annals Lyceum Nat. Hist., New York, vol. 1, 1824. p. 174, 2 pls.; Isis (oder Encycl. Zeitung), Oken, 1825 and 1832.

Isotelus n. g.

—— Observations on a fossil crustaceous animal of the order Branchiopoda. Read Dec. 12, 1825.

In Annals Lyceum Nat. Hist., New York, vol. 1, pt. 2, p. 375, pl. 29. Republished in Harlan's Med. Phys. Researches, 1835, p. 297.

Eurypterus n. g.

—— Report on several fossil multilocular shells from the State of Delaware; with observations on a second specimen of the new fossil genus Eurypterus. Read Oct. 2, 1827.

In Annals Lyceum Nat. Hist., New York, vol. 2, 1828, p. 273.

Deslongchamps (E.) Mémoire sur les corps organisés fossiles du grès intermédiaire du Calvados.

In Soc. Linn. Calvados, vol. 2, 1825, p. 291, 2 pls.

The author herein describes two species of the genus *Homalonotus* under the names *Asaphus brongniarti* and *A. brevicaudatus*.

Dethleff (von) and **Boll** (Ernst). Die Trilobiten Mecklenburgs.

In Archiv Vereins Freunde Naturg. Mecklenburg, 1858, p. 155.

Remopleurides, *Paradoxides*, *Ellipsocephalus*, *Olenus*, *O.* (*Sphærophthalmus*), *Proetus*, *Cyphaspis*, *Harpides*, *Phacops*, *Calymene*, *Homalonotus*, *Lichas*, *Trinucleus*, *Ampyx*, *Asaphus*, *Ogygia*, *Illænus*, *Nileus*, *Acidaspis*, *Cheirurus*, *Sphærexochus*, *Sphærocoryphe*, *Amphion*, *Encrinurus*, *Bronteus*, *Telephus*, *Holometopus*, *Dolichometopus*, *Agnostus*.

Devine (T.) Description of a new Trilobite from the Quebec group.

In Canadian Naturalist, vol. 8, 1863, p. 95, 2 figs.

Loganellus n. g.

Similar forms have been referred by Corda to the genus *Ptychoparia*.

—— Description of a new Trilobite from the Quebec group.

In Canadian Naturalist, vol. 8. 1863, p. 210, fig.

Menocephalus salteri.

Dewalque (G.) Prodrome d'une description géologique de la Belgique. Bruxelles, 1868; 2d ed., 1880.

Contains important list of fossils, and observations.

Dumont (A.-H.) Mémoire sur la constitution géologique de la province de Liège.

In Mém. Cour. Acad. Roy. Sci., Bruxelles, vol. 8, 1832, p. 353. Table of fossils.

Durocher (J.) Sur le test des Trilobites et des animaux fossils de la Bretagne en général.

In Bull. Soc. Géol. France, 2d series, vol. 7, p. 307, also vol. 8, 1850–'51, p. 160.

Dwight (W. B.) Recent explorations in the Wappinger Valley limestone of Dutchess County, New York.

In Am. Jour. Sci., 3d series, vol. 27, 1884, p. 349, pl. 7.

Bathyurus.

Eaton (Amos). Geological Equivalents.

Description of *Ogygies latissimus* and *Cancer trilobioides*.

In Am. Jour. Sci., 1st series, vol. 21, 1832, pp. 135, 136, note.

Cancer trilobioides, *Oxygies*.

—— Trilobites.

Am. Jour. Sci., 1st series, vol. 22, 1832, p. 165.

Brongniartia n. g.

We learn from reference to Dr. Amos Eaton's description and figures given in his "Geological text-book," p. 33, pl. 1, fig. 3 (2d ed., 1832), that the original of *Brongniartia carcinodea* Eaton was the same as that afterwards described by Dr. Jacob Green (Monthly Am. Jour. Geology, vol. 1, June, 1832; also Mon. Tril. N. A., p. 87, pl. 1, fig. 6, cast 34) as *Triarthrus beckii*.

—— Geological text-book for aiding the study of North American geology; being a systematic arrangement of facts collected by the author for his pupils, etc. 2d ed., 5 pls. (June 15, 1832).

The following species are described in this work, pp. 31–34: Genus *Calamena*, *C. blumenbachii* (*Calymene senaria* Conrad), pl. 2, fig. 19; genus *Asaphus*, *A. hausmannii*, *A. caudatus* (*Dalmanites limulurus* Green), pl. 2, fig. 18; *A. selenourus* (Dalmanites selenurus Eaton), pl. 1,

Eaton (Amos)—Continued.

fig. 1; genus *Brongniartia*, *B. platycephala* (*Homalonotus dekayi* Green), pl. 2, fig, 20; *B. isotelea* (*Asaphus platycephalus* Stokes), pl. 2, fig. 22; *B. carcinodia* (*Triarthrus becki* Green), pl. 1, fig. 3; genus *Nuttainia*, *N. concentrica* (*Trinucleus concentrica* Eaton), pl. 1, fig. 2; *N. sparsa* (*Homalonotus dekayi* Green).

Eichwald (Eduard). Observationes geognostico-zoologicæ per Ingriam marisque Baltici Provincias nec non de Trilobites. Casani, 1825, 4 pls.

The author herein describes and figures eight species of Lower Silurian Trilobites under the new generic term *Cryptonymus*. In his later work ("Lethœa Rossica," p. 1449) the first three are referred to the genus *Asaphus*; viz, *Cryptonymus schlotheimii* to *Asaphus schlotheimii*, *Cryp. weissii* to *Asaphus weissii*, *Cryp. panderi* to *Asaphus expansus* Wahl. The last five are classed as follows: *Cryp. lichtensteinii* under *Niobe lichtensteinii*, *Cryp. rosenbergii* to *Illænus rosenbergii*, *Cryp. wahlenbergii* to *Illænus wahlenbergii*, *Cryp. rudolphii* to *Illænus rudolphii*, *Cryp. parkinsonii* to *Illænus parkinsonii*.

This work also contains a description and a figure of *Asaphus fischeri* (*Amphion fischeri* Eich.).

The description of two new Carbonic Trilobites are added by Dr. G. Fischer, pp. 53–55, pl. 4, figs. 4 and 5, *Asaphus brongniarti*, pl. 4, fig. 5, and *A. eichwaldi*, pl. 4, fig. 4. Valerian von Möller ("Ueber die Trilobiten der Steinkohlenformation des Ural," 1867, p. 7) refers these species to *Phillipsia eichwaldi* Fisch., applying the term to the non-mucronate pygidium. The Russian mucronate species, figured by Eichwald ("Lethœa Rossica," pl. 54, fig. 10) as *Griffithides eichwaldi*, was assigned by the same author to *Phillipsia mucronata* McCoy.

—— Zoologia specialis, quam expositis animalibus tum vivis tum fossibilibus postissernum Rossiæ in Universum et Poloniæ. Vilnæ, vols. 1–3, 1829–'31. (*)

—— Die Thier- und Pflanzenreste des alten rothen Sandsteins und Bergkalk in Novgorodischen Gouvernement.

In Bull. Acad. Petropol. St. Petersburg, vol. 7, 1840, p. 78.

Otarion eichwaldi.

—— Ueber das silurische Schichten-System von Ehstland. St. Petersburg, 1840.

Krustazeen, p. 64.

Calymene odini, *C. blumenbachii* Brong., *C. downingia* Murch., *C. macrophthalma* Murch., *C. bellatula* Dalm., *C. sembnitzkii*, *Amphion* (*Asaphus*) *fischeri*, *Zethus verrucosus* Pander, *Cryptonymus punctatus* (Wahl.) Eichwald, *C. variolaris*, *C. wörthii*, *Asaphus expansus* Wahl., *A. weissii*, *A. schlotheimii*, *A. latus* Pander, *A. laceniatus* Dalm., *A. dilatatus* Dalm, *A. devexus*, *A. tyrannus* Murch., *A. vulcani* Murch., *Illænus crassicauda* Dalm., *I. rosenbergii*, *I. cornutus* Pander, *I. perovatis* Murch., *I. centrotus* Dalm., *Trinucleus sparskii*, *Homalonotus herschelii* Murch., *Nileus armadillo* Dalm., *Agnostus nasutus* Dalm.

—— Die Urwelt Russlands durch Abbildungen erläutert.

4 pts., St. Petersburg, 1840–'48, 14 pls.

In the first part of this work, in the list of fossils given, p. 22, Eduard von Eichwald refers three species to *Cryptonymus*; a generic name which he used in 1825 for an entirely different series of fossil crustacea. In the present work he substitutes the name for such species as *Calymene variolaris*, *C. punctatus*, *C. worthi*, etc. The name is used without a generic description, and only indicated by the above named species.

Metopias n. g., pt. 2, p. 64, pl. 3, fig. 4.

—— Beiträge zur Geologie und Palæontologie Russlands. Moscau, 1854.

Bunodes n. g.

—— Die Grauwacken Schichten von Liv- und Estland.

In Bull. Soc. Imp. des Naturalistes Moscou, vol. 27, 1854, no. 1, p. 3.

Eurypterus, *Pterygotus*, *Bunodes*, *Sphagodus*.

—— Ueber die Gattungen *Cryptonymus* und *Zethus*.

In Bull. Soc. Imp. des Naturalistes Moscou, vol. 28, 1855. Separate ed., Moscou, 1855, 23 pp.

The author maintains that the genus *Cryptonymus* should be retained for several Russian and Swedish Trilobites as defined by N. P. Angelin ("Palæont. Scand.," 1852, p. 2), with *Calymene punctatus* as its type.

—— Beiträge zur geographischen Verbreitung der fossilen Thiere Russland's.

In Bull. Soc. Nat., Moscou, vols. 28–30, 1855–'57 (vol. 30, 1857).

Harpes, *Proetus*, *Cyphaspis*, *Homalonotus*, *Calymene*, *Griffithides*, *Phacops*, *Chasmops*, *Odontochile*, *Lichas*, *Trinucleus*, *Ampyx*, *Asaphus*, *Ptychopyge*, *Megalaspis*, *Nileus*, *Illænus*, *Dysplanus*, *Cheirurus*, *Sphærexochus*, *Amphion*, *Cryptonymus*, *Bronteus*, *Lonchodomas*, *Raphiophorus*, *Zethus*, *Sphærocoryphe*, *Eurypterus*, *Pterygotus*, *Beyrichia*, *Bairdia*.

—— Lethæa Rossica, ou paléontologie de la Russ. Stuttgart, 1852–'69. 3 vols., with atlas, 113 pls.

The Crustacea are arranged in the following order: First order, Ostracopodia, first family, Cypridina, genus 1. *Leperditia*, 2. *Bairdia*, 3. *Beyrichia*. Second order, Pœcilopoda, second family, Agnostidæ, genus 4. *Agnostus*. Third order, Copépoda, third family, Eurypteridæ, genus 5. *Eurypterus*, 6. *Pterygotus*. Fourth order, Xiphosuridæ, fourth family, Limulidæ, genus 7. *Campylocephalus* n. g. Fifth order, Isopodes, Trilobites, family Harpidæ, genus 9.

Eichwald (Eduard)—Continued.

Harpes, 10. *Trinucleus*, 11. *Ampyx*, 12. *Lonchodomas*, 13. *Raphiophorus;* sixth family, Lichidæ, genus 14. *Lichas;* seventh family, Cheiruridæ, genus 15. *Acidaspis*, 16. *Ceraurus*, 17. *Sphærexochus*, 18. *Zethus*, 19. *Sphærexocoryphe;* eighth family, Amphionidæ, genus 20. *Amphion*, 21. *Homalonotus*, 22. *Cryptonymus;* ninth family, Calyminidæ, genus 23. *Calymene*, 24. *Acaste*, 25. *Phacops*, 26. *Chasmops*, 27. *Proetus*, 28. *Griffithides*, 29. (not given), 30. *Cyphasis;* tenth family, Remopleuridæ, genus 31. *Bunodes*, 32. *Pseudoniscus*, 33. *Remopleurides;* eleventh family, Asaphidæ, genus 34. *Asaphus*, 35. *Megalaspis*, 36. *Niobe*, 37. *Ptychopyge*, 38. *Ogygia*, 39. *Illænus*, 40. *Rhodope*, 41. *Dysplanus*, 42. *Actinobolus*, 43. *Nileus;* twelfth family, Brontidæ, genus 44. *Bronteus*.

—— Beiträge zur nähern Kenntniss der in meiner Lethæa Rossica beschriebenen Illænus, etc.

In Bull. Soc. Imp. des Naturalistes Moscou, 1863, No. 4, p. 372.

Nileus, *Bumastus*.

Emerson (B. K.) On the geology of Frobisher Bay and Field Bay.

Appendix 3. Narrative of the second Arctic expedition made by Charles F. Hall, 45th Cong., 3d sess., Senate Doc. 27, Washington, 1879.

Triarthrus, *Cyphaspis*, *Phacops*, *Calymene*, *Asaphus*, *Beyrichia*, *Leperditia*, *Primitia*.

Emmons (Ebenezer). Geology of New York. Pt. 2. Comprising the survey of the Second Geological District. Albany, 1842.

Isotelus gigas, fig. 99 (1); *Bumastus trentonensis*, fig. 100 (1); *Calymene senaria*, fig. 100 (2); *Illænus trentonensis*, fig. 100 (3); *Ceraurus pleurexanthus*, fig. 100 (6); *Trinucleus tessellatus*, fig. 100 (7); *Triarthrus beckii*, fig. 110 (1); *Trinucleus caractaci*, fig. 112 (1).

—— The Taconic system, based on observations in New York, Massachusetts, Maine, Vermont, and Rhode Island. Albany, 1844, 6 pls. and map.

Atops trilineatus n. s. and genus. fig. 8; *Elliptocepala asaphoides* n. s. and genus (not *Ellipsocephalus* Zenker, 1833), fig. 9.

—— Agriculture of New York, comprising an account of the classification, composition, and distribution of the soils and rocks, etc. Vol. 1. Albany, 1846, 21 pls. and maps.

Atops trilineatus, fig. 8; *Elliptocephala asaphoides*, fig. 9.

—— On the identity of the *Atops trilineatus* and the *Triarthrus beckii* Green, with remarks upon the *Elliptocephalus asaphoides*.

In Proc. Am. Assoc. Adv. Sci., First meeting, Philadelphia, 1848.

Atops trilineatus, *Triarthrus beckii*, *Eliptocephalus asaphoides*.

—— American geology, containing a statement of the principles of the science, with full illustrations of the characteristic fossils. Vol. 1, Parts I, II, and VI. Albany, 1855–'57, atlas, 17 pls.

Dikelocephalus, *Olenus*, *Triarthrus*, *Atops*, *Conocephalus*, *Elliptocephalus*, *Phacops*, *Calymene*, *Trinucleus*, *Isotelus*, *Ogygia*, *Illænus*, *Acidaspis*, *Ceraurus*, *Agnostus*, *Microdiscus* n. g., *Beyrichia*, *Cytherina*, *Cyproides*.

—— Manual of geology, designed for the use of colleges and academies. New York, 1860.

Paradoxides? quadrispinosus, fig. 57; *Paradoxides macrocephalus*, fig. 70; *Atops punctatus*, fig. 71; *Microdiscus quadricostatus*, fig. 73; *Calymene senaria*, fig. 87; *Illænus trentonensis*, fig. 89 (a); *Illænus crassicauda*, fig. 89 (b); *Triarthrus beckii*, figs. 89 (c) and 91; *Isotelus gigas*, fig. 89 (d); *Beyrichia*, *Cytherina*, *Cyproides*, fig. 90; *Trinucleus caractaci*, fig. 93 (1); *Hemicripturus*, fig. 97 (2); *Illænus barriensis* fig. 98 (3); *Dalmania selenurus*, fig. 118 (1); *Phacops bufo*, fig. 124 (6); *Dalmania calliteles*, fig. 124 (7); *Phacops nupera*, fig. 138 (2); *Cyphaspis girardeauensis*, fig. 145 (2); *Homalonotus dekayi*, figs. 134, 135.

Note A, p. 280, the author remarks: "We now know the following trilobites, all of which belong to a slate beneath the Calciferous; viz, *Atops punctatus*, *Eliptocephalus* (*Paradoxides*) *asaphoides*, *Paradoxides thompsoni*, *P. vermonti*, *P. macrocephalus*, *Paradoxides* (*Pagura*) *quadrispinosus*, and *Microdiscus quadricostatus*."

Dr. E. Emmons uses the name *Pagura* as a subgenus to *Paradoxides* without indicating his intention with regard to the genus. He may have intended it to replace the generic name of *Peltura* (*Olenus*) *holopyga* Hall, 12th Rept. New York State Cab. Nat. Hist., p. 61, which in the 13th Rept. New York State Cab. Nat. Hist., p. 118, is used for the type of *Bathynotus* Hall, 1860.

The preface of the manual is dated Raleigh, May 1, 1859.

Emmrich (H. F.) De Trilobitis dissertatio petrefactologica quam consensu et auctoritate amplissimi philosophorum ordinis, etc. Berolini, 1839, 1 pl.

Classifies 65 species and 9 genera and 6 subgenera, as follows:

1. Phacops.
2. Asaphus
   - Sec. 1. Ogygia.
   - 2. Asaphus.
   - 3. Illænus.
   - 4.
3. Calymene
   - Sec. 1. Calymene.
   - 2. Trimerus.

Emmrich (H. F.)—Continued.

4. Depleura.
5. Conocephalus.
6. Ellipsocephalus.
7. Ampyx.
8. Paradoxides.
9. Odontopleura.
10. Cyphæus.

—— Zur Naturgeschichte der Trilobiten. Programm zur öffentlichen Prüfung, welche mit den Zöglingen der Realschule in Meiningen Donnerstag dem 28. und Freitag den 29. März 1844 im grossen Hörsaale der Anstalt abgehalten werden soll, etc. Meiningen, 1844, 1 pl.

Pt. 1. Zur Morphologie der Trilobiten, pp. 4–13.

Pt. 2. Ueber die Trilobitengattungen, pp. 13–18.

Pt. 3. Ueber die Verbreitung der Trilobiten in den Gebirgsschichten, pp. 18–28.

The genera are arranged into 25 families in the following order:

1. *Phacops*, *Dalmania* n. g., 2. *Phillipsia*, 3. *Griffithides*, 4. *Gerastos*, 5. *Asaphus*, 6. *Illænus*, 7. *Ogygia*, 8. *Bronteus*, 9. *Nuttania*, 10. *Encrinurus* n. g., 11. *Amphion*, 12. *Calymene*, 13. *Homalonotus*, 14. *Conocephalus*, 15. *Ellipsocephalus*, 16. *Anthes*, 17. *Paradoxides*, 18. *Odontopleura*, 19. *Arges*, 20. *Cryptolithus*, 21. *Ampyx*, 22. *Olenus*, 23. *Remopleurides*, 24. *Ceraurus*, 25. *Agnostus*.

—— Ueber die Trilobiten.

In Neues Jahrbuch für Mineral., 1845, p. 18, 1 pl.

For list of genera, see preceding reference.

—— On the morphology, classification, and distribution of the Trilobites.

Scientific Memoirs, edited by Richard Taylor, vol. 4, 1846, pt. 14, p. 253, 1 pl.

Translation of the preceding reference.

Esmark (H. M. T.) Om nogle nye Arten af Trilobiter. (*)

In Mag. for Naturvidensk., andre Række, Christiania, vol. 1, 1833, p. 268, pl. 8.

Trilobiter asellus, *T. elliptifrons*, *T. sphærius*, *T. semilunaris*, *T. dentatus*.

Etheridge (Robert). Description of the Palæozoic and Mesozoic fossils of Queensland.

In Quart. Jour. Geol. Soc. London, vol. 28 1872, p. 317.

Griffithides dubius, pl. 18, fig. 7.

—— Memoirs Geological Survey of Scotland. Edinburgh, 1873.

Expl. Map 23, p. 93.

Ceratiocaris.

—— Observations on a few Graptolites from the Lower Silurian rocks of Victoria, Australia, with a further note on the structure of Ceratiocaris.

In Annals Mag. Nat. Hist., London, 4th series, vol. 14, 1874, p. 1.

—— On the remains of a large Crustacean probably indicative of a new species of *Eurypteridæ*, or allied genus (*Eurypterus stevensoni*), from the Lower Carboniferous series (Cementstone group) of Berwickshire.

In Quart. Jour. Geol. Soc. London, vol. 33, 1877, p. 223, 2 figs.

—— Palæontology of the coasts of the Arctic lands visited by the late British expedition under Capt. Sir George Nares, etc.

In Quart. Jour. Geol. Soc. London, vol. 34, 1878, p. 568.

Proetus, *Calymene*, *Asaphus*, *Encrinurus*, *Bronteus*.

—— On the occurrence of the genus *Dithyrocaris* in the Lower Carboniferous or Calciferous sandstone series of Scotland, and on that of a second species of *Anathrapalæmon* in these beds.

In Quart. Jour. Geol. Soc. London, vol. 35, 1879, p. 464, pl. 23.

Dithyrocaris, *Anthrapalæmon*.

—— On the occurrence of a small new Phyllopod Crustacean, referable to the genus *Leaia* in the Lower Carboniferous rocks of Edinburgh.

In Annals Mag. Nat. Hist., London, 5th series, vol. 3, 1879, p. 257.

—— and **Nicholson** (H. A.) See **Nicholson** (H. A.) and **Etheridge** (Robert).

—— and **Salter** (J. W.) See **Salter** (J. W.) and **Etheridge** (Robert).

—— Notes on a collection of fossils from the Palæozoic rocks of New South Wales.

In Proc. Royal Soc. New South Wales, vol. 19, 1880, p. 247, 1 pl.

Encrinurus punctatus.

—— Address of the President.

In Quart. Jour. Geol. Soc. London, vol. 37, 1881, p. 37.

—— Reports of the committee, consisting of Mr. R. Etheridge, Dr. Henry Woodward, and Prof. T. Rupert Jones, secretary, on the fossil Phyllopoda of the Palæozoic rocks.

See Reports of the secretary, recorded under **Jones** (T. Rupert). See, also, **Woodward** (Henry) and **Etheridge** (Robert); **Huxley** (T. H.) and **Etheridge** (Robert).

Etheridge, jr. (Robert). On the occurrence of a macrurous decaped (*Anthrapalæmon woodwardi* sp. nov.) in the Red Sandstone or lowest group of the Carboniferous formation of the southeast of Scotland.

In Quart. Jour. Geol. Soc. London, vol. 33, 1877, p. 863, pl. 27.

—— On *Pinnocaris lapworthi*.

Proc. Royal Phys. Soc., 1878, vol. 4, p. 167.
Pinnocaris n. g.

—— On the genus *Conocephalites*.

In Proc. Royal Soc. Tasmania, June, 1882, p. 152.

Feistmantel (Ottokar). Ueber ein neues Vorkommen von nordischen silurischen Diluvilgeschieben bei Lampersdorf in der Grafschaft Glatz (Zeitschrift Lotos, Dec., 1874, p. 10, Prag).

Phacops downingiæ, Leperditia marginata.

Fischer (G. de Waldheim). Notice sur l'Eurypterus de Podolie et le Chirotherium de Livonie. Moscou, 1839, 2 pls.

Eurypterus remipes, E. lacustris?, E. tetragonophthalmus n. s.

Fitch (Asa). Fossils of Washington County, New York.

In Trans. New York Agric. Soc., vol. 9, 1850, p. 862.
Atops trilineatus, Olenus asaphoides, Trinucleus concentrica.

Fletcher (W. F.) Observations on Dudley Trilobites.

In Quart. Jour. Geol. Soc. London, vol. 6, 1850, p. 235, pls. 27, 27 *bis*.
Lichas bucklandi, L. hirsutus, L. grayii, L. salteri, L. barrandii.

—— Observations on Dudley Trilobites. Part 2.

In Quart. Jour. Geol. Soc. London, vol. 6, 1850, p. 402, pl. 32.
Cybele punctata, C. variolaris.

Foerste (A. F.) The Clinton group of Ohio.

In Bull. Denison Univ., vol. 1, 1885, p. 65, 2 pls.
Acidaspis, Bathyurus?, Illænus, Calymene, Lichas, Arionellus?, Dalmanites.

—— The Clinton group of Ohio. Pt. 2.

In Bull. Denison Univ., vol. 2, 1887, p. 89, pl. 8.
Proetus, Phacops, Dalmanites, Calymene, Lichas, Illænus, Acidaspis, Ceraurus, Encrinurus.

—— Note on Illæni.

In Fifteenth Rept. Geol. Nat. Hist. Survey Minnesota, 1886, p. 478.
Illænus minnesotensis, I. herricki, I. ambiguus, I. insignis Hall.

Foerste (A. F.)—Continued.

—— Notes on Palæozoic fossils. Pt. 2.

In Bull. Denison Univ., vol. 3, pt. 2, 1888, p. 117, pl. 13.
Phacops, Lichas, Sphærexochus, Encrinurus, Microdiscus.

Forbes (Edward). Description of *Ampyx nudus*.

In Mem. Geol. Survey United Kingdom, decade 2, London, 1849, pl. 2.
Ampyx nudus, Brachampyx n. g.

Ford (S. W.) Description of some new species of Primordial fossils.

In Am. Jour. Sci., 3d series, vol. 3, 1872, p. 419.
Agnostus nobilis.

—— Descriptions of new species of fossils from the Lower Potsdam group at Troy, New York.

In Am. Jour. Sci., 3d series, vol. 6, 1873, p. 137.
Microdiscus speciosus, Leperditia troyensis.

—— Note on the discovery of a new locality of Primordial fossils in Rensselaer County, New York.

In Am. Jour. Sci., 3d series, vol. 9, 1875, p. 204.
Conocephalites (Atops) trilineatus Emmons.

—— On additional species of fossils from the Primordial of Troy and Lansingburg, Rensselaer County, New York.

In Am. Jour. Sci., 3d series, vol. 11, 1876, p. 369.
Microdiscus meeki.

—— Note on *Microdiscus speciosus*.

In Am. Jour. Sci., 3d series, vol. 13, 1877, p. 141.

—— On some embryonic forms of Trilobites.

In Am. Jour. Sci., 3d series, vol. 13, 1877, p. 265, pl. 4.
Metamorphoses of *Olenellus (Elliptocephalus) asaphoides*.

—— Description of two new species of Primordial fossils.

In Am. Jour. Sci., 3d series, vol. 15, 1878, p. 124.
Solenopleura nana.

—— Note on the development of *Olenellus asaphoides*.

In Am. Jour. Sci., 3d series, vol. 15, 1878, p. 129.

—— Life of the Silurian age.

New York Tribune Extra, September 2, 1879.
In this paper Mr. S. W. Ford gives generic figures of Trilobites, including figures of *Microdiscus speciosus*.

—— Note on the Trilobite *Atops trilineatus* Emmons.

In Am. Jour. Sci., 3d series, vol. 19, 1880, p. 152.

—— On additional embryonic forms of Trilobites from the Primordial rocks of Troy, New York, with observations on

Ford (S. W.)—Continued. the genera *Olenellus*, *Paradoxides*, and *Hydrocephalus*.

In Am. Jour. Sci., 3d series, vol. 22, 1881, p. 250, 13, figs.

—— Note on the age of the Swedish Paradoxides beds.

In Am. Jour. Sci., 3d series, vol. 32, 1886, p. 473.

—— and **Dwight** (W. B.) Preliminary report of S. W. Ford and W. B. Dwight upon fossils obtained in 1885 from metamorphic limestones of the Taconic series of Emmons, at Canaan, New York. Pl. 7.

In Am. Jour. Sci., 3d series, vol. 31, 1886, p. 248.

Genal spine of Trilobite, perhaps *Asaphus megistos*.

Frech (Fritz). Ueber das Devon der Ostalpen.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 39, 1888, p. 659.

Phacops, *Cheirurus*, *Encrinurus*, *Arethusina*.

—— Die paläozoischen Bildungen von Cabrières, etc.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 39, 1887, p. 360, pl. 24.

Harpes, *Phacops*, *Proetus*, *Dechenella*, *Lichas*, *Cheirurus*, *Bronteus*, *Ogygia*.

Gehler (J. C.) De quibusdam varioribus agri Lipsiensis petrificatis. Spec. I. Trilobites f. *Entomoslithus paradoxus* Linné. Lipsiæ, 1793 [1 pl.].

The author gives a sketch of the bibliography of the Trilobites, and figures several specimens of *Calymene blumenbachii*.

Geinitz (H. B.) Grundriss der Versteinerungs-Kunde. Dresden, 1846, 28 pls.

Limulus, *Halicyne*, *Belinurus*, *Eurypterus*, *Cytherina*, *Calymene*, *Homalonotus*, *Dipleura*, *Trimerus*, *Cyphaspis*, *Phacops*, *Aconia*, *Illænus*, *Archegonus*, *Asaphus*, *Dysplanus*, *Nileus*, *Ampyx*, *Trinucleus*, *Ogygia*, *Odontopleura*, *Arges*, *Bronteus*, *Paradoxides*, *Olenus*, *Conocephalus*, *Ellipsocephalus*, *Harpes*, *Cytherea*, *Cypridina*, *Cyprella*, *Cypridella*, *Pollicipes*, *Cyclus*.

—— Carbonformation und Dyas in Nebraska. Dresden, 1866, 5 pls.

Phillipsia sp. ?; *Cythere*.

Genzmar. Beschreibung einer versteinerten Muschel mit dreifachen Rücken. (*)

In Gesell. der Ober-Lausitz Lobau, vol. 2, 1758; also, vol. 3, p. 185, fig. 17-21; Neues, Mag., Hamburg, 1772.

This author gives a description of the Trilobites of Mecklenburg, especially those of his own collection.

Gerstäcker (A.) In Bronn's Die Klassen und Ordnungen der Arthropoden wissenschaftlich dargestellt in Wort und Bild. Crustacea. Leipzig und Heidelberg, 1866–'79, p. 1142, pls. 43–49.

Agnostus, *Homalonotus*, *Phacops*, *Dalmanites*, *Cheirurus*, *Cromus*, *Deiphon*, *Staurocephalus*, *Ampyx*, *Hydrocephalus*, *Acidaspis*, *Telephus*, *Æglina*, *Lichas*, *Sphærexochus*, *Triarthrus*, *Dindymene*, *Barrandia*, *Illænus*, *Nileus*, *Ogygia*, *Bronteus*, *Asaphus*, *Paradoxides*, *Phillipsia*, *Carmon*, *Ellipsocephalus*, *Cyphaspis*, *Arethusina*, *Proetus*, *Arionellus*, *Remopleurides*, *Bohemilla*, *Calymene*, *Conocephalites*, *Olenus*, *Peltura*, *Arera*, *Sao*, *Phacoparia*, *Amphion*, *Encrinurus*, *Zethus*, *Trinucleus*, *Dionides*. *Harpides*, *Harpes*, *Aristozoe*, *Beyrichia*, *Bolbozoe*, *Callizoe*, *Caryon*, *Crescentilla* *Cythere*, *Cytheropsis*, *Elpe*, *Entomis*, *Heppa*, *Leperditia*, *Isochilina*, *Orozoe*, *Nothozoe*, *Primitia*, *Zonozoe*, *Cryptocaris*, *Aptychopsis*, *Adelophthalmus*, *Eurypterus*, *Limulus*, *Pterygotus*, *Belinurus*, *Prestwichia*, *Hemiaspis*.

Giebel (C.) Die silurische Fauna des Unterharzes.

In Abhandl. Nat. Vereins Sachsen u. Thüringen, vol. 1, 1858, p. 1, 7 pls.

Harpes, *Proetus*, *Cyphaspis*, *Phacops*, *Lichas*, *Dalmannia*, *Acidaspis*, *Bronteus*.

Goldfuss (A.) Observation sur la place qu'occupent les Trilobites dans le règne animal.

In Annales Sci. Nat. Paris, vol. 15, 1828, p. 83, pl. 2.

Asaphus, *Calymene*.

—— Catalogue des Trilobites.

In Handbuch der Geognosie von de la Beche, 1832.

This list was copied by Dr. Jacob Green in his "Monograph of the Trilobites of North America," p. 20.

—— Beiträge zur Familie der fossilen Crustaceen.

In Nova Acta Physico Med., vol. 19, 1839, Breslau, p. 353, pl. 33.

Harpes n. g., *Arges* n. g., *Brontes* n. g., *Illænus ? triacanthus*.

—— Systematische Uebersicht der Trilobiten und Beschreibung einiger neuen Arten.

In Neues Jahrbuch für Mineral., 1843, p. 537, pls. 4–6.

Harpes, *Paradoxides*, *Olenus*, *Anthes* n. g., *Olenus scarabœoides*, *Conocephalus*, *Ellipsocephalus*, *Proetus*, *Acaste*, *Gerastos* n. g., *Phacops*, *Calymene*, *Homalonotus*, *Dipleura*, *Cryptolithus*, *Ampyx*, *Asaphus*, *Isotelus*, *Symphysurus* n. g., *Ogygia*, *Cryptonymus*, *Odontopleura*, *Ceraurus*, *Otarion*, *Arges*, *Zethus*, *Amphion*, *Bronteus*, *Illænus*, *Bumastus*, *Nileus*, *Agnostus*.

Classifies 204 species under 32 genera.

Goodchild (J. G.) and **Postlethwaite** (J.). *See* **Postlethwaite** (J.) and **Goodchild** (J. G.).

Green (Jacob). Synopsis of the Trilobites of North America. In which some new genera and species are proposed.

Monthly Am. Jour. Geology, Phila., vol. 2, 1832, p. 558, pl. 14. Republished in Dr. Jacob Green's "Monograph of the Trilobites of North America," Phila., 1832. List given in Dr. R. Harlan's "Med. Phys. Researches," Phila., 1835, p. 300.

Calymene blumenbachii, *C. callicephala*, *C. selenecephala*, *C. platys*, *C. microps*, *C. anchiops*, *C. diops*, *C. bufo*, *Asaphus caudatus*, *A. selenurus*, *A. pleuroptyx*, *A. wetherilli*, *A. micrurus*, *A. limulurus*, *A. laticostatus*, *Trimerus* n. g., *T. delphinocephalus* (pl. 14, fig. 1), *Cryptolithus* n g., *C. tessellatus* (pl. 14, fig. 4), *Dipleura* n. g., *D. dekayi* (pl. 14, figs. 8, 9), *Isotelus gigas*, *I planus*, *I. cyclops* (pl. 14, fig. 7), *Triarthrus* n. g., *T. beckii* (pl. 14, fig. 6), *Paradoxides boltonii* (pl. 14, fig. 5), *Ceraurus* n. g., *C. pleurexanthemus* (pl. 14, fig. 10).

—— A monograph of the Trilobites of North America, with colored models of the species. Philadelphia, 1832, 94 pp., 1 pl. (Oct. 1, 1832).

Calymene, *Asaphus*, *Hemicrypturus* n. g., *Ogygia*, *Isotelus*, *Cryptolithus*, *Dipleura*, *Trimerus*, *Ceraurus*, *Triarthrus*, *Nuttainia*, *Brongniartia*.

—— A supplement to the monograph of the Trilobites of North America, with colored models of the species. Philadelphia, 1835, 24 pp. (May 1, 1835).

Paradoxides, *Calymene*, *Asaphus*.

—— A new Trilobite. Letter to the editor, Dec. 26, 1832.

In Am. Jour. Sci., 1st series, vol. 23, 1833, p. 397.

Asaphus myrmecoïdes.

—— Description of a new Trilobite from Nova Scotia.

In Trans. Geol. Soc. Pennsylvania, vol. 1, pt. 1, 1834, p. 37, pl. 4.

Asaphus crypturus.

—— Description of some new North American Trilobites.

In Am. Jour. Sci., 1st series, vol. 25, 1834, p. 334.

Calymene odontocephalus, *Asaphus astragalotes*, *A. tetragonocephalus*, *Paradoxides harlani*.

—— Description of a new Trilobite.

In Am. Jour. Sci., 1st series, vol. 32, 1837, p. 167.

Calymene phtyctainodes, *Asaphus platypleurus*.

—— Description of two new species of Trilobites. Read Jan. 24, 1837.

Green (Jacob)—Continued.

In Jour. Acad. Nat. Sci. Phila., vol. 7, 1837, p. 217, 2 wood-cuts.

Cryphæus n. g., *C. boothi*, *Asaphus trimblii*.

J. W. Salter (Mon. Brit. Tril., p. 15) gives the following diagnosis of the genus, and uses it as a subgenus to *Phacops*: "Form of moderate size, depressed. Glabella depressed, not much expanded in front; all the lobes distinct, the front ones not greatly enlarged, genal angles long-spined. Pleura truncate, and the hinder ones often produced into spines. Tail large, of many segments; the margin spinose."

—— Description of several new Trilobites.

In Am. Jour. Sci., 1st series, vol. 32, 1837, p. 343, 2 wood-cuts.

Cryphæus, *C. boothi*, *C. callitelus*, *Trimerus jacksonii*, *Asaphus trimblii*.

—— Some remarks on the genus *Paradoxides* Brong., and the necessity of preserving the genus *Triarthrus*, proposed in the Monograph of the Trilobites of North America.

In Am. Jour. Sci., 1st series, vol. 33, 1838, p. 341.

—— Description of a new Trilobite.

In Am. Jour. Sci., 1st series, vol. 33, 1838, p. 406.

Calymene rowii.

This Trilobite was figured by Mr. Row in the Poughkeepsie Telegraph, Nov. 22, 1837.

—— Description of a new Trilobite.

In Annals Mag. Nat. History, 1st series. vol. 1, 1838, p. 79.

Calymene rowii.

—— The inferior surface of the Trilobite discovered.

In The Friend, a weekly Journal, Philadelphia, March 16, 1839.

Calymene bufo.

—— The inferior surface of the Trilobite discovered. Illustrated, with colored models. Philadelphia, 1839.

Calymene bufo.

—— Remarks on the Trilobites.

In Am. Jour. Sci., 1st series, vol. 37, 1839, p. 25.

This article appears to be a republication of the two preceding references, with the addition of the remarks on p. 38 of the Journal

—— An additional fact, illustrating the inferior surface of *Calymene bufo*.

In Am. Jour. Sci., 1st series, vol. 38, 1840, p. 410.

Grewingk (C.) Geologie von Liv- und Kurland.

In Archiv Natur. Liv-, Ehst- u. Kurl., Dorpat, vol. 2, pt. 3, 1861, p. 571, 4 pls.

Beyrichia.

Griffith (Richard).

Two important works on the paleontology and geology of Ireland were prepared under the direction of Mr. Richard Griffith by Frederick McCoy, who will be counted as the author, although Mr. Richard Griffith was the collector of the specimens and the financial supporter of the publications.

The contributions on the Paleozoic Crustacea are given under McCoy (Frederick) in this work.

Grote (A. R.) and **Pitt** (W. H.) New specimen from the Water Lime group at Buffalo, N. Y.

In Proc. Am. Assoc. Adv. Sci., 26th meeting, Nashville, 1877, p. 300.

Pterygotus cummingsi.

—— —— Description of a new Crustacean from the Water Lime group at Buffalo.

In Bull. Buffalo Soc. Nat. Sci., vol. 3, 1875, p. 1.

Eusarcus n. g.

—— —— On new species of *Eusarcus* and *Pterygotus* from the Water Lime group at Buffalo.

In Bull. Buffalo Soc. Nat. Sci., vol. 3, 1875, p. 17, plate.

Eusarcus, Pterygotus.

Gruenwaldt (M.) Beiträge zur Kenntniss der sedimentären Gebirgsformationen des Ural.

In Mém. Acad. Sci. St.-Pétersbourg, 7th series, vol. 2, No. 7, 1860, 6 pls.

Phillipsia, Leperditia.

Guettard (E.-T.) Mémoire sur les ardoisières d'Angers.

In Mém. Acad. Sci. Paris, 1757, p. 52, pls. 7-9. Reprint: Amsterdam, 1768.

The author in his memoir on the geology of Angers gives descriptions and figures of several Trilobites. These were afterwards described by Alex. Brongniart under the genus *Ogygia* and named by this author *Ogygie de Guettard* and *O. desmarestii.*

Haldeman (S. S.) On the supposed identity of *Atops trilineatus* with *Triarthrus beckii.*

In Am. Jour. Sci., 2d series, vol. 5, 1848, p. 107.

Hall (Charles E.) Contribution to palæontogy from the Museum of the Second Geological Survey of Pennsylvania.

In Proc. Am. Philos. Soc., Phila., vol. 16, 1877, p. 621.

Eurypterus.

Hall (James). Description of two species of Trilobites belonging to the genus *Paradoxides.*

In Am. Jour. Sci., 1st series, vol. 33, 1838, p. 139, 2 figs.

Read before the Yale Natural History Society, March 21, 1837.

Paradoxides beckii, P. eatoni.

—— Trilobites of the inferior strata.

(Extracted and published in advance of the "Palæontology of New York," vol. 1, Albany, 1846, p. 225, pls. 60-67.)

Olenus, Phacops, Calymene, Platynotus, Trinucleus, Asaphus, Isotelus, Acidaspis, Ceraurus, Illænus, Agnostus.

—— Palæontology of New York. Vol. 1. Containing descriptions of the organic remains of the lower divisions of the New York system. Albany, 1847, 100 pls.

Olenus, Phacops, Calymene, Platynotus, Trinucleus, Asaphus, Isotelus, Acidaspis, Ceraurus, Illænus, Agnostus.

—— Remarks on the observations of S. S. Haldeman "On the supposed identity of *Atops trilineatus* with *Triarthrus beckii.*"

In Am. Jour. Sci., 2d series, vol. 5, 1848, p. 322, 10 wood-cuts.

—— Descriptions of new species of fossils, and observations upon some others previously not well known, from the Trenton limestones.

In Third Rept. New York State Cab. Nat. Hist., 1850, p. 167, 5 pls. (2 eds.).

Asaphus extans.

This species was used by Mr. E. Billings for the type of *Bathyurus.*

—— Description of new or rare species of fossils from the Palæozoic series.

In Rept. Geol. Lake Superior Land Dist. (Foster and Whitney), 1851, pt. 2, p. 203, pls. 22-35.

Harpes escanabiæ, Dikelocephalus, Proetus, Phacops anchiops, P. callicephalus, Asaphus barrandi; tracks of a Crustacean?

—— Palæontology of New York. Vol. 2. Containing descriptions of the organic remains of the lower divisions of the New York system. Albany, 1852, 104 pls.

Phacops, Proetus, Calymene, Homalonotus, Arges, Lichas, Acidaspis, Ceraurus, Cybele, Bumastis, Beyrichia, Cytherina, Onchus.

—— Notes on some fossils of the so-called Taconic system described by Doctor Emmons.

In Am. Jour. Sci., 2d series, vol. 19, 1855, p. 434.

Olenus (Elliptocephalus) asaphoides.

Hall (James)—Continued.

—— Description of new species of fossils from the Carboniferous limestone of Indiana and Illinois.

Read in 1856 and published separately by the author. See, also, Trans. Albany Inst., vol. 1, pt. 1, 1857, p. 1.

Cytherina carbonaria.

Descriptions of these fossils, with additional notes by R. P. Whitfield, were published in the Bull. Am. Mus. Nat. Hist., New York, vol. 1, No. 3, 1882.

The original descriptions, with additional observation by James Hall, with the plates from R. P. Whitfield's memoir, were published in the 12th Annual Rept. Geol. Nat. Hist. Indiana, 1882, pp. 321–375, pls. 29–32.

—— The Trilobites of the shales of the Hudson River group.

In Twelfth Rept. New York State Cab. Nat. Hist., 1859, p. 59, 3 wood-cuts. See, also, Palæont. New York, vol. 3, 1859; Geol. Vermont, vol. 1, 1861; 13th Rept. New York State Cab. Nat. Hist., 1860.

Olenus thompsoni, O. vermontana, Peltura (Olenus) holopyge.

—— Geological Survey New York. Palæontology. Vol. 3. Containing descriptions and figures of the organic remains of the Lower Helderberg group and the Oriskany sandstone. 1855–'59.

Pt. 1, text, 1859; pt. 2, plates, 1861, 120 pls.

Proetus, Phacops, Dalmania, Homalonotus, Lichas, Acidaspis, Bronteus, Eurypterus, Dolichopterus n. subgenus, *Pterygotus, Leperditia, Beyrichia, Ceratiocaris, Olenus thompsoni, O. vermontana, Peltura (Olenus) holopyge.*

—— Description of new species of fossils from the Silurian rocks of Nova Scotia.

In Canadian Naturalist, vol. 5, 1860, p. 144.

Homalonotus dawsoni Hall, *Calymene blumenbachii, Dalmania logani* Hall, *Beyrichia pustulosa* Hall, *B. æqilatera* Hall, *Leperditia sinuata* Hall.

—— Contributions to palæontology, 1858 and 1859. Notes and observations upon the fossils of the Goniatite limestone in the Marcellus shale of the Hamilton group in the eastern and central parts of the State of New York, and those of the Goniatite beds of Rockford, Indiana; with some analogous forms from the Hamilton group proper.

In Thirteenth Rept. New York State Cab. Nat. Hist., 1860, p. 95.

Proetus doris Hall.

—— Note upon the Trilobites of the shales of the Quebec group in the town of Georgia, Vermont.

In Thirteenth Rept. New York State Cab. Nat. Hist., 1860, p. 113.

Barrandia n. g.

This term was used by Frederick McCoy, in 1844, for a genus of Trilobites.

Bathynotus n. g.

—— New species of fossils from the Hudson River group of Ohio and the Western States.

In Thirteenth Rept. New York State Cab. Nat. Hist., 1860, p. 119.

Calymene christyi, Proetus parviusculus.

—— Geological Survey of Wisconsin. Description of new species of fossils from the investigations of the survey, etc. Report of the superintendent of the Geological Survey, exhibiting the progress of the work, January 1, 1861, p. 11.

Dalmanites, Calymene, Illænus.

—— Preliminary notice of the Trilobites and other Crustacea of the Upper Helderberg, Hamilton, and Chemung groups.

Author's edition, published in 1861, 11 pls., 170 pp.; 15th Rept. New York State Cab. Nat. Hist., 1862, p. 82.

Olenellus n. g., *Proetus, Phacops, Dalmania, Calymene, Homalonotus, Lichas, Acidaspis, Beyrichia, Leperditia.*

—— Note on the genus Cypricardites.

In Fifteenth Rept. New York State Cab. Nat. Hist., 1861, p. 192. Plate illustrating certain genera and species described by T. A. Conrad in the 5th Annual Rept. Pal. Dept. New York Geol. Survey, 1841, pl. 11 (reprint).

Dicranurus, pl. 11, fig. 1; *Aspidolites*, pl. 11, fig. 2; *Acidaspis tuberculatus*, pl. 11, fig. 3.

—— Note upon the Trilobites of the Hudson River group, in the town of Georgia, Vermont.

In Geol. Vermont, vol. 1, 1861, p. 367, pl. 13.

Barrandia, B. vermontana, Bathynotus, B. holopyga.

—— Palæontology of Wisconsin. Remarks upon the condition of the fossils in the rocks of the several formations. Catalogue of fossils known in the Palæozoic formations of Wisconsin, with observations upon some of the known species and descriptions of several new forms.

Geol. Survey Wisconsin, vol. 1, 1862, p. 425.

—— On a new Crustacean from the Potsdam sandstone. A letter addressed to Principal Dawson, dated Albany, Oct. 31, 1862.

Hall (James)—Continued.

In Canadian Naturalist, vol. 7, 1862, p. 443, figure. See The Geologist, vol. 6, London, 1863, p. 247, figure.

Aglaspis n. g.

—— On the occurrence of Crustacean remains of the genera *Ceratiocaris* and *Dithyrocaris*, with a notice of some new species from the Hamilton group and Genesee slate.

In Sixteenth Rept. New York State Cab. Nat. Hist., Albany, 1863, p. 71, plate.

—— Preliminary notice of the fauna of the Potsdam sandstone, with remarks upon the previously known species of fossils, and description of some new ones from the sandstones of the Upper Mississippi Valley.

In Sixteenth Rept. New York State Cab. Nat. Hist., 1863, p. 119, 6 pls. Supplementary note, p. 110.

Dikelocephalus, *Triarthrella* n. g., *Conocephalus*, *Arionellus*, *Chariocephalus* n. g., *Ptychaspis* n. g., *Lichas*, *Illænurus* n. g., *Amphion?*, *Agnostus*, *Pemphigaspis* n. g., *Aglaspis*.

—— Notice of some new species of fossils from a locality of the Niagara group in Indiana, with a list of identified species from the same place.

In Trans. Albany Inst., vol. 4, 1864, p. 195. Author's edition published May 2, 1863, pp. 1–34.

Dalmania, *Cyphaspis*, *Lichas*.

Plates of the species. 28th Rept. New York State Mus. Nat Hist., 1879.

—— Account of some new or little known species of fossils from rocks of the age of the Niagara group.

In Twentieth Rept. New York State Cab. Nat. Hist., 1867, p. 305, 21 pls. Originally printed in advance for the 18th Report New York State Cab. Nat. Hist., 1864. Revised edition, Albany, 1870, with 22 pls.

Dalmania, *Calymene*, *Lichas*, *Acidaspis*, *Ceraurus*, *Sphærexochus*, *Illænus*, *Encrinurus*, *Bronteus*.

—— Geological Survey of the State of Wisconsin, 1859–'63. Palæontology. Pt. 3. Organic remains of the Niagara group and the associated limestones. 94 pp., 18 pls. Albany, 1871.

The same was published in 1864 in advance for the 18th Rept. New York State Cab. Nat. Hist., 1867, under the title of "Account of some new or little known species of fossils from rocks of the age of the Niagara group." See 20th Rept. New York State Cab. Nat. Hist., rev. edition, 1870, p. 347.

Hall (James)—Continued.

—— Descriptions of new species of fossils from the Hudson River group in the vicinity of Cincinnati, Ohio.

In Twenty-fourth Rept. New York State Mus. Nat. Hist., Albany, 1872, p. 225, 1 pl.

Published Oct., 1871, in advance of the State Cab. report.

Leperditia, *Beyrichia*.

—— Descriptions of new species of Crinoids and other fossils from strata of the age of the Hudson River group and Trenton limestone.

In Twenty-fourth Rept. New York State Mus. Nat. Hist., 1872, p. 205, 3 pls.

Dalmania breviceps, *Proetus parviusculus*.

Advance sheets of this article were printed and distributed in November, 1866, except the first four species of Crinoidea mentioned in the foot-note on p. 205, which were first published in 1871 in a pamphlet entitled "New species of fossils from the Hudson River group in the vicinity of Cincinnati, Ohio."

—— The fauna of the Niagara group in central Indiana.

Documents only of Twenty-eighth Rept. New York State Mus. Nat. Hist., 1876, 34 pls.

—— The fauna of the Niagara in central Indiana.

In Twenty-eighth Rept. New York State Mus. Nat. Hist., 1879, p. 99, 34 pls.

Cyphaspis, *Dalmanites*, *Odontocephalus*, *Calymene*, *Homalonotus*, *Lichas*, *Ceraurus*, *Illænus*, *Beyrichia*, *Leperditia*.

—— Illustrations of Devonian fossils: Gasteropoda, Pteropoda, Cephalopoda, Crustacea, and Corals of the Upper Helderberg, Hamilton, and Chemung groups, etc. Albany, 1876, 7 pp., 133 pls.

Proetus, *Phillipsia* (*Brachymetopus?*), *Phacops*, *Dalmanites*, *Calymene*, *Homalonotus*, *Lichas*, *Acidaspis* (*Terataspis*), *Dithyrocaris*, *Ceratiocaris*.

—— Descriptions of new species of fossils from the Niagara formation at Waldron, Indiana.

In Trans. Albany Inst., vol. 10, 1883, p. 57. Read 1879, and published separately in 1881.

Acidaspis fimbriata, *Illænus* (*Bumastus*), *Ioxus*.

—— Description of the species of fossils found in the Niagara group at Waldron, Indiana.

In Eleventh Ann. Rept. for 1881, Dept. Geol. Nat. Hist. Survey Indiana, 1882, p. 217, 36 pls.

Cyphaspis, *Dalmanites*, *Odontocephalus*, *Calymene*, *Homalonotus*, *Lichas*, *Acidaspis*, *Illænus*, *Beyrichia*, *Leperditia*.

Hall (James)—Continued.

—— Note on the *Eurypteridæ* of the Devonian and Carboniferous formations of Pennsylvania, with a supplementary note on the *Stylonurus excelsior.*

In Proc. Am. Assoc. Adv. Sci., 33d meeting, Phila., 1884, p. 420.

—— *Eurypteridæ* from the Devonian and Carboniferous formations of Pennsylvania. With 6 pls.

Extracted Rept. Prog. PPP., 2d Geol. Survey Pennsylvania, 1884.

—— Note on the *Eurypteridæ* of the Devonian and Carboniferous formations of Pennsylvania.

In Second Geol. Survey Pennsylvania, Rept. Prog. PPP., 1884, 6 pls.

Eurypterus, Dolichopterus, Pterygotus, Stylonurus, Eurypterus (Anthraconectes) mazonensis M. & W.

—— Description of a new species of *Stylonurus* from the Catskill group.

In Thirty-sixth Rept. New York State Mus. Nat. Hist., 1884, p. 76, pl. 5.

Stylonurus excelsior Hall.

There was a short notice of this species published by D. S. Martin (Trans. New York Acad. Sci., vol. 2, 1882, p. 8). This notice was based upon a cast of the carapace in the New York State Museum, which had been labeled with name and locality by Prof. James Hall.

—— and **Whitfield** (R. P.) Descriptions of new species of fossils from the vicinity of Louisville, Ky., and the Falls of the Ohio.

In Twenty-fourth Rept. New York State Mus. Nat. Hist., 1872, p. 181, pl. 13, figs 20 and 21.

Illænus cornigerus H. & W.

—— —— Geological Survey of Ohio. Vol. 2. Geology and palæontology. Pt. 2. Palæontology. 1875, p. 67, pls. 1–12.

Proetus, Dalmania, Calymene, Lichas, Encrinurus, Leperditia (Isochilina), Beyrichia, Plumulites.

—— —— Palæontology.

In U. S. Geol. Expl. 40th Parallel, vol. 4, pt. 2, 1877, 7 pls.

Dikellocephalus, Conocephalites, Crepicephalus (Loganellus), Ptychaspis, Chariocephalus, Bathyurus, Proetus, Ogygia, Agnostus.

—— and **Clarke** (John M.) Geological Survey of the State of New York. Palæontology. Vol. VII. Text and plates, containing descriptions of the Trilobites and other Crustacea of the Oriskany, Upper Helderberg, Hamilton, Portage, Chemung, and Catskill groups. Albany, 1888, 236 pp., 36 pls.

Hall (James) and **Clarke** (John M.)—Continued.

Trilobita: *Calymene, Homalonotus, Bronteus, Phacops, Dalmanites* subgen., *Hausmanni* n. s. g., *Coronura* n. s. g., *Cryphæus, Odontocephalus, Corycephalus, Chasmops, Lichas* subgen., *Terataspis, Conolichas, Hoplochas, Arges, Ceratolichas, Proetus, Phæthonides, Cyphaspis.*

Xiphosura: *Protolemulus, Eurypterus, Stylonurus*

Phyllocaridæ: *Ceratiocaris, Echinocaris, Elymocaris, Tropidocaris.*

Pinæcaridæ: *Mesothyra* n. g.

Rhinocardæ: *Rhinocaris* n. g.

Discinocaridæ: *Spathiocaris, Dipterocaris.*

Decapoda: *Palæopalæmon.*

Phyllopoda: *Estheria, Schizodiscus* n. g.

Cirripidæ: *Protobalanus.*

Palæocreusia: *Stropbilepis* n. g., *Turrilepas.*

Hancock (Abbany). Remarks on certain vermiform fossils found in the mountain limestone districts of the north of England.

In Rept. 28th Meeting Brit. Assoc. Adv. Sci., 1858, Tran. of Sec., p. 80.

Tracks of Trilobites.

Harlan (Richard). Critical notices of various organic remains hitherto discovered in North America.

In Trans. Geol. Soc. Pennsylvania, vol. 1, pt. 1, 1834, p. 46, 1 pl.

The author herein describes two species of *Eurypterus* and gives a list of North American Trilobites.

Eurypterus remipes De Kay, *E. lacustris* Harlan.

—— Notice of nondescript Trilobites from the State of New York, with observations on the genus *Triarthrus*, etc.

In Trans. Geol. Soc. Pennsylvania, vol. 1, pt. 2, 1835, p. 263, pl. 15.

Paradoxides triarthrus Har., *P. arcuatus* Har., *P. scaraboides* Brong.

—— Medical and physical researches, or original memoirs in medicine, surgery, physiology, geology, zoology, etc. Phila., 1835, 36 pls.

Contains a republication of the above articles under Harlan, pp. 253–313 and 400–403.

Hartt (C. F.) Fossils of the Primordial or Acadian group at St. John.

In Acadian Geology, the geological structure, organic remains, and mineral resources of Nova Scotia, etc., by J. W. Dawson, 2d ed., London, 1868, pp. 641–657; also 3d ed., 1878, with supplement (wood-cuts).

Paradoxides, Conocephalites, Microdiscus, Agnostus.

Mr. C. F. Hartt, in his original description of *Microdiscus dawsoni* Hartt, described the species under the new generic name of Dawsonia.

Hartt (C. F.)—Continued.

In the Acadian Geology the species is placed under the genus *Microdiscus* on the authority of Mr. E. Billings, of the Canadian Geological Survey.

—— Appendix B. List of New Brunswick fossils.

See Bailey's "Observations on the Geol. of Southern New Brunswick, etc.," 1865, p. 143.

—— and **Rathbun** (Richard). Morgan Expedition, 1870–'71. On the Devonian Trilobites and Mollusks of Ereré, Province of Pará, Brazil.

In Annals Lyceum Nat. Hist., New York, vol. 11, 1875, p. 110.

Dalmania paituna H. & R., *Homalonotus oiara* H. & R.

Hauer (F. von). Ueber Barrande's Versuch einer Classifikation der Trilobiten.

In Sitzungsber. d. Wien. Akad. Math.-naturw, Classe, V, p. 304, 1850.

Haulp (K.) Die Fauna der Graptholitengest.

In Lausitzische Mag., vol. 44, Görlitz, 1878, p. 75, pl. 5.

Beyrichia.

Hawle (Ignaz). See **Corda** (A. J. C.) and **Hawle** (Ignaz).

Hayden (F. V.) See **Meek** (F. B.) and **Hayden** (F. V.).

Heidenhain (F.) Ueber Graptholitenführende Diluvial-Geschiebe der norddeutschen Ebene.

In Zeitschr. Deutsch. geol. Gesell., vol. 21, 1869, p. 143, plate.

Calymene blumenbachi, *Dalmanites caudata*, *Odontopleura ovata*, *O. nutica*, *Cyphaspis*, *Homalonotus*, *Beyrichia klœden*, *B. maccoyana*, *B. tuberculatus.*

Hellman (A.) Die Petrefacten Thüringens. Cassel, 1866, 5 pts., 24 pls.

Dalmania tuberculata, *Acidaspis buchi*, *Paradoxides spinosus.*

Hermann (L. D.) Maslographia Brigæ, Massel, 1711, pl. 9, fig. 50; pl. 11, fig. 44; pl. 12, fig. 31.

The author herein compares a fragment of the pygidium of an *Encrinurus* to a scollop shell.

Herrick (C. L.) A sketch of the geological history of Licking County, accompanying an illustrated catalogue of Carboniferous fossils from Flint Ridge, Ohio.

In Bull. Denison Univ., vol. 2, pt. 1, 1887, p. 5, 7 pls.

Proetus, *Phillipsia*, *Griffithides*, *Brachymetopus*, *Dalmanites?*

Herrick (C. L.)—Continued.

—— Appendix 2. A Waverly Trilobite.

In Bull. Denison Univ., vol. 2, pt. 1, 1887, p. 69, pl. 7, fig. 14.

Phillipsia shumardi Herrick.

—— The geology of Licking County, Ohio. Pt. IV. The Subcarboniferous and Waverly groups.

In Bull. Denison Univ., vol. 3, 1888, p. 13, pls. 2, 11, and 12.

Phillipsia meramecensis Sh., *P. shumardi* Her., *P. præcursor* Her.

—— On the Trilobites of the Ohio Waverly group.

In Author's advance sheets from the Bull. Denison Univ., vol. 4, 1889, 1 pl.

Proetus, *Phæthonides*, *Phillipsia*, *Cythere.*

—— Notes upon the Waverly group in Ohio.

In Am. Geologist, vol. 3, 1889, p. 94, 4 pls. (not descriptive).

Hibbert (*Dr.*) On the fresh-water limestone of Burdiehouse, in the neighborhood of Edinburgh, belonging to the Carboniferous group of rocks; with supplementary notes on other fresh-water limestones.

In Trans. Royal Soc. Edinburgh, vol. 13, 1836, p. 169, pl. 9.

The author gives reduced figures of *Eurypterus remipes* De Kay and *E. lacustris* Harlan, taken from Dr. Richard Harlan's article on "Organic Remains of North America."

Hicks (Henry). Note on the genus *Anopolenus.*

In Quart. Jour. Geol. Soc. London, vol. 21, 1865, p. 477, figures.

Anopolenus.

—— Description of new species of fossils from the Longmynd rocks of St. David's.

In Quart. Jour. Geol. Soc. London, vol. 27, 1871, p. 399, pl. 15.

Paradoxides, *Plutonia*, *Conocoryphe*, *Microdiscus*, *Agnostus*, *Leperditia?*

—— On some undescribed fossils from the Menevian group, with a note on the Entomostraca by Prof. T. Rupert Jones.

In Quart. Jour. Geol. Soc. London, vol. 28, 1872, p. 173, pls. 5–7.

Anoplenus, *Cerausia* n. g., *Erinnys*, *Conocoryphe*, *Arionellus*, *Holocephalina*, *Agnostus*, *Leperditia*, *Entomis.*

—— On the Tremadoc rocks in the neighborhood of St. David's, South Wales, and their fossil contents.

In Quart. Jour. Geol. Soc. London, vol. 29, 1873, p. 39, 3 pls.

Neseuretus n. g., *Niobe.*

Hicks (Henry)—Continued.

—— Descriptions of new species of fossils from the Arenig group of St. David's.

In Quart. Jour. Geol. Soc. London, vol. 31, 1875, p. 182, 3 pls.

Phacops, Calymene, Trinucleus, Ampyx, Barrandia, Æglina, Placoparia, Illænus, Illænopsis?

—— Appendix to Fossiliferous Cambrian shales, near Cærnarvon, by J. E. Marr.

In Quart. Jour. Geol. Soc. London, vol. 32, 1876, p. 135.

Caryocaris, Æglina.

Hisinger (W.) Anteckningar i physik och geognosi under resor uti Sverige och Norrige. Stockholm, 8 pts., 1828–'40.

The first three parts contain scarcely anything on Crustacea; the remaining parts contain only enumerations of fossils, without descriptions.

Cytherina phaseolus His., pt. 5, pl. 8, fig. 3.

—— Tableau des pétrifications de la Suède distribuées en ordre systématique. Stockholm, 1829.

This work enumerates 40 species of Silurian Crustacea previously described by J. W. Dalman.

The second edition of this work bears the title "Esquisse d'un tableau des pétrifications de la Suède," Stockholm, 1831.

This work contains 43 pages and a systematic table of the fossils, in which 46 species of fossil Crustacea are mentioned.

—— Lethæa Svecica, seu petrificata Sveciæ iconibus et characteribus illustrata duobus supplementis. Holmiæ, 1837–'41, 4to, 42 pls.

The first part of this work was published in 1835 under the title "Icones petrificatorum Sveciæ. Fas. I. Animalia articulata et mollusca Cephalopoda." The plates, 1 to 10, were sent by the author only to his friends. In 1837, Lethæa Svecica was published; it contained 124 pages and 39 plates. The first three are marked A, B, C. The fossil Crustacea described in this work are those of J. W. Dalman's Palæaderna, with copies of his descriptions and figures. The second supplement, published at Stockholm in 1840, contains eleven pages and three plates. Figures and descriptions of *Calymene clavifrons*, *Asaphus* (*Trinucleus*) *secticornis*, *A. cyllarus* (*Trinucleus*) and *Calymene* (*Cheirurus*) *speciosa*. "Lethæa Svecica, seu petrificata Sveciæ, supplementa secundi continuatio," was published at Stockholm in 1841; it contains six pages and three plates (60–62). Figures and description of a *Calymene*.

Höeninghaus (F. W.) Beschreibung über Abbildungen von *Calymene arachnoides*. Crefeld, 1835, 1 pl. (*)

—— Ueber die Versteinerungen des Uebergangs-Thonschiefers von Weissenbach im Dillenburgschen. (*)

In Isis (oder Encycl. Zeitung), Oken, 1830, p. 96; Neues Jahrbuch für Mineral., 1831, p. 341.

Calymene macrophthalma.

—— Trilobiten der geognostischen Sammlung. Crefeld, 1843, plate. (*)

Asaphus dalmani.

—— *Harpes reflexus.* Crefeld, 1847, 1 p., 1 pl.

Hoffman (E.) Sämmtliche bis jetzt bekannte Trilobiten Russlands.

In Verhandl. russ. k. mineral. Gesell. zu St. Petersburg, 1857–'58, p. 21, 7 pls.

Proetus, Phillipsia, Phacops, Chasmops, Calymene, Lichas, Ampyx, Asaphus, Cheirurus, Sphærexochus, Zethus, Encrinurus, Amphion, Bronteus, Illænus, Nileus, Agnostus.

Holl (F.) Handbuch der Petrefactenkunde, etc. Dresden, 1841, p. 155.

Calymene, Asaphus, Nileus, Illænus, Lichas, Ampyx, Ogygia, Olenus, Battus.

The author gives short descriptions of the Trilobites described by Alex. Brongniart, J. W. Dalman, E. Eichwald, von Schlotheim, and others.

Holl (H. B.) See **Jones** (T. Rupert) and **Holl** (H. B.).

Hollier (E.) On a specimen of *Homalonotus delphinocephalus* found at Dudley.

Trans. Manchester Geol. Soc., vol. 9, 1869, p. 28.

Holm (Gerhard). Anteckningar om Wahlenberg's *Illænus crassicauda*.

In Svenska Vetensk. Akad. Förhandl., 1880, No. 4, p. 3, Stockholm, pl. 5.

—— Bemerkungen über *Illænus crassicauda* Wahl.

In Zeitschr. deutsch. geol. Gesell., vol. 32, pt. 2–4, 1880, p. 559, pl. 23.

—— Ueber einige Trilobiten aus dem Phyllograptus-Schiefer Dalekarliens.

In Kongl. Svenska Vet. Akad. Handl., vol. 6, No. 9, 1882, pl. 5.

Pliomera törnquisti, Megalaspis dalecarlicus, Ampyx pater, Agnostus törnquisti, Trilobites brevifrons.

—— De Svenska arterna af Trilobitolagtet *Illænus* Dalman.

In Kongl. Svenska Vet. Akad. Handl., vol. 7, No. 3, 1882, 6 pls.

Holm (Gerhard)—Continued.

—— Om thoraxledernas antal hos *Paradoxides tessini* Brongn.

In Geol. Föreningens Stockholm Förhandl., vol. 9, 1887, p. 408.

—— Om förekomsten af en Cruziana i öfversta Olenidskiffern vid Knifvinge i Vreta Kloster Socken i Östergötland.

In Geol. Föreningens Stockholm Förhandl., vol. 9, 1887, p. 412.

—— Om *Olenellus kjerulfi* Linrs.

In Geol. Föreningens Stockholm Förhandl., vol. 9, 1887, p. 493, pls. 14, 15.

Honeyman (D.) On new localities of fossiliferous Silurian rocks in eastern Nova Scotia.

In Canadian Naturalist, vol. 5, 1860, p. 293.

Dr. J. W. Dawson adds a note to this paper, describing *Homalonotus dawsoni* Hall, fig. 1, with notes on other fossils.

—— On the geology of Arisaig, Nova Scotia, with a note by Prof. T. Rupert Jones.

In Quart. Jour. Geol. Soc. London, vol. 26, 1870, p. 490.

The note by Prof. T. R. Jones, on p. 492, on some Entomostraca from Arisaig, mentions the following genera:

Beyrichia, *Leperditia*, *Primitia*.

—— Notes of examination by Prof. James Hall of the Silurian collection of the Provincial Museum, by the Rev. D. Honeyman.

In Proc. and Trans. Nova Scotian Inst. Nat. Sci., vol. 7, pt. 1, 1886, p. 14.

Asaphus ditmarsiæ Honeyman.

—— The Giant Trilobite of Moose River Iron Mine, Nova Scotia.

In Proc. and Trans. Nova Scotian Inst. Nat. Sci., vol. 7, pt. 1, 1888, p. 63.

In this article Dr. D. Honeyman refers *Asaphus ditmarsiæ* to Dr. Jacob Green's *Asaphus? crypturus*, giving a copy of the original description of that species from Trans. Geol. Soc. Pennsylvania, vol. 1, pt. 1, 1834, p. 37.

How (Henry). Notice of the occurrence of a Trilobite in the Lower Carboniferous limestone of Hants County.

In Proc. and Trans. Nova Scotian Inst. Nat. Sci., vol. 1, 1867, pt. 1, p. 87.

Hutton (F. W.) On a Trilobite from New Reefton, New Zealand, new to Australia.

In Proc. Linn. Soc. New South Wales, section 2, vol. 2, 1887-'88, p. 257.

Huxley (T. H.) Observations on the structure and affinities of *Himantopterus*.

In Quart. Jour. Geol. Soc. London, vol. 12, 1856, p. 34.

Huxley (T. H) and **Salter** (J. W.) Monograph of the fossil Crustacea forming the genus *Pterygotus*, with its anatomy and affinities.

In Mem. Geol. Survey United Kingdom. Description of Brit. organic remains. Monograph No. 1. London, 1859, atlas of 16 pls.

—— and **Etheridge** (Robert). A catalogue of the collection of fossils in the Museum of Practical Geology, with an explanatory introduction. London, 1865.

—— A catalogue of the Cambrian and Silurian fossils in the Museum of Practical Geology. London, 1878.

This catalogue was drawn up by Mr. E. T. Newton, under Prof. T. H. Huxley's superintendence.

The specimens were named by Mr. Robert Etheridge, palæontologist to the Geological Survey of Great Britain.

Jackson (Charles T.) Nouveau gisement de Trilobites découvert près de Boston.

In Comptes Rendus Acad. Sci. Paris, vol. 43, 1856, p. 883.

Paradoxides tessini, *P. harlani*, *P. spinulosus*.

—— Sur un moule du *Paradoxides harlani*.

In Comptes Rendus Acad. Sci. Paris, vol. 46, 1858, p. 254.

James (J. F.) Catalogue of fossils of Cincinnati group, published by order of the Committee on Palæontology. Cincinnati, 1871.

James (U. P.) Palæontology. Catalogue of Lower Silurian fossils of Cincinnati group, found at Cincinnati and vicinity, etc. Cincinnati, April, 1875.

—— Supplement to Catalogue of Lower Silurian fossils of the Cincinnati group, etc. Cincinnati, July 10, 1879.

—— Descriptions of new species of fossils from the Cincinnati group, Ohio and Kentucky.

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Tracks of Crustacean (?), pl. 2, fig. 4.

Johnstrup (Fr.) Oversigt over de palæozoiske Dannelser paa Bornholm meddelt paa det 11te Skandinaviske Naturforskermede i Kjöbenhavn, 1873, p. 299.

Jones (T. Rupert). On Permian Entomostraca.

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Cythere.

Jones (T. Rupert)—Continued.

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Beyrichia.

This article forms Appendix D to a paper on the Carboniferous and Silurian formations of the neighborhood of Bussaco, in Portugal, by Senhor Carlos Ribeiro, with notes and a description of the animal remains by D. Sharpe, T. W. Salter, and T. R. Jones, etc. See same journal, p. 135, pls. 7–9.

—— Notes on the Palæozoic bivalved Entomostraca. No. 1. Some species from the Upper Silurian limestone of Scandinavia.

In Annals Mag. Nat. Hist., 2d series, London, vol. 16, 1855, p. 81, pl. 5.

Beyrichia.

—— Notes on Palæozoic bivalved Entomostraca. No. 2. Some British and foreign species of *Beyrichia.*

In Annals Mag. Nat. Hist., 2d series, London, vol. 16, 1855, p. 163, pl. 6.

Beyrichia.

—— Notes on Palæozoic bivalved Entomostraca. No. 3. Some species of *Leperditia.*

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Leperditia.

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In Annals Mag. Nat. Hist., 3d series, London, vol. 1, 1858, p. 244, pls. 9, 10. See, also, Rogers's Final Rept. Geol. Survey Pennsylvania, 1858, pt. 2, p. 834, figs. 695–699.

—— Additional notes on Palæozoic Entomostraca from Canada.

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Leperditia, Isochilina.

—— On the Palæozoic Entomostraca of Canada.

In Geol. Survey Canada, figure and description of Canadian organic remains, decade 3, Montreal, 1858, p. 91, pl. 2; also Annals Mag. Nat. Hist., 3d series, London, vol. 1, 1858, p. 244, pl. 9.

Beyrichia, Leperditia, Isochilinia n. g., *Cytheropsis.*

—— Explanation map 32. The geology of the neighborhood of Edinburgh, by H. H. Howell and A. Geikie; with appendix and list of fossils, by J. W. Salter.

In Mem. Geol. Survey Gt. Brit., London, 1861, p. 137, pl. 2, fig. 5.

Jones (T. Rupert)—Continued.

Prof. T. Rupert Jones herein uses the name of *Entomis* for certain fossils. For a full generic description, see Annals Mag. Nat. Hist., 4th series, London, vol. 11, 1873, p. 413.

—— A monograph of the fossil *Estheriæ.*

In Palæont. Soc. London, vol. 14, 1862, 134 pp., 5 pls.

Estheria, Leaia n. g., *Beyrichia, Candona, Cypridea.*

—— Note on *Estheria niddendorfii.*

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 73.

—— On fossil *Estheria* and their distribution.

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 140; also Nat. Hist. Review, 1863, p. 262.

—— and **Kirkby** (J. W.) Notes on the Palæozoic bivalved Entomostraca. No. 5.

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Leperditia, Cytherella, Bairdia, Cythere.

—— and **Holl** (H. B.) Notes on the Palæozoic bivalved Entomostraca. No. 6.

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Primitia n. g.

—— and **Kirkby** (J. W.) Notes on Palæozoic bivalved Entomostraca. No. 7.

In Annals Mag. Nat. Hist., 3d series, London, vol. 18, 1866, p. 32.

Entomoconchus, Daphnia, Bairdia, Cythere.

—— and **Holl** (W. B.) Notes on Palæozoic bivalved Entomostraca. No. 8. Some Lower Silurian species from Chair of Kildare, Ireland.

In Annals Mag. Nat. Hist., 4th series, London, vol. 2, 1868, p. 54, pl. 7.

Primitia, Cythere, Bairdia.

—— and **Holl** (H. B.) Notes on Palæozoic bivalved Entomostraca. No. 9.

In Annals Mag. Nat. Hist., 4th series, London, vol. 3, 1869, p. 211, pls. 14, 15.

Cythere, Bairdia, Beyrichia, Primitia, Thlipsura n. g., p. 213; *Cytherellina* n. g., p. 215; *Kirkbya* n. g., *Movea* n. g., *Æchmina* n. g., p. 217.

—— On ancient Water-fleas of the Ostracodous and Phyllopodous tribes (bivalved Entomostraca).

In Month. Microsc. Jour., vol. 4, London, 1870, p. 184, pl. 61.

Leperditia, Bairdia, Thlipsura, Cythere, Cytherella, Cytherellina, Æchmina, Carbonia, Cypridina, Cypridella, Cyprella, Entomoconchus, Entomis, Primitia, Kirkbya, Moorea, Isochilinia, Beyrichia, Leaia, Estheria.

Jones (T. Rupert)—Continued.

—— On some bivalved Entomostraca from the Coal Measures of South Wales.
In Geol. Mag., vol. 7, 1870, p. 214, pl. 9.
Cytheroid Entomostraca.

—— On the Palæozoic bivalved Entomostraca.
In Proc. Geologist Assoc., 1870.

—— Note on the Entomostraca from the Cambrian rocks of St. David's.
In Quart. Jour. Geol. Soc. London, vol. 28, 1872, p. 183, pl. 5.
Leperditia, *Entomis*. Larval trilobite?
This paper forms a part of Henry Hicks's article on some undescribed fossils from the Menevian Group. Same Jour., p. 173.

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In Annals Mag. Nat. Hist., 4th series, London, vol. 11, 1873, p. 413.
Entomis, *Entomidella* n. g.

—— On some bivalved Entomostraca, chiefly Cypridenidæ of the Carboniferous formations.
In Quart. Jour. Geol. Soc. London, vol. 29, 1873, p. 409.
Sulcuna n. g., *Cyprella*.

—— Ancient Water-fleas, etc. Pt. 2.
In Monthly Microsc. Jour., vol. 10, London, 1873, p. 71.
Cythere, *Thlipsura*.

—— Notes on some forms of British Entomostraca from the Silurian rocks of Peeblesshire.
In Trans. Edinburgh Geol. Soc., vol. 2, pt. 3, 1874, p. 321.
Beyrichia, *Bairdia*, *Entomis*.

——, **Kirkby** (J. W.) and **Brady** (M. P.) Monograph of British fossil bivalve Entomostraca from the Carboniferous formations.
In Palæont. Soc. London, 1874.
Pt. 1. The Cypridinadæ and their allies, 5 pls
Cypridina, *Asterope*, *Philomedes*, *Bradycinetus*, *Eurypylus*, *Conchœcia*, *Halocypris*, *Heterodesmus*, *Polycope*, *Cytherella*, *Cypridinella* n. g., *Cypridellina* n. g., *Cypridella*, *Sulcuna*, *Cyprella*, *Rhombina* n. g., *Entomoconchus*, *Offa* n. g., *Cladocopa*, *Platycopa*.

—— and **Kirkby** (J. W.) Notes on the Palæozoic bivalved Entomostraca. No. 11.
In Annals Mag. Nat. Hist., 4th series, London, vol. 15, 1875, p. 52, pl. 6.
Beyrichia, *Leperditia*, *Primitia*, *Bairdia*, *Cythere*. *Cytherella*.

—— Notes on some fossil bivalved Entomostraca.
In Geol. Mag., decade 2, vol. 5, 1878, p. 100, pl. 3.
Esthere, *Cypris*, *Candona*, *Cypridia*.

Jones (T. Rupert) and **Kirkby** (J. W.) Description of the species of the Ostracodous genus *Bairdia* McCoy, from the Carboniferous strata of Great Britain.
In Quart. Jour. Geol. Soc. London, vol. 35, 1879, p. 565, 5 pls.

—— —— Notes on the Palæozoic bivalved Entomostraca. No. 12. Some carboniferous species belonging to the genus *Carbonia* Jones.
In Annals Mag. Nat. Hist., 5th series, London, vol. 4, 1879, p. 28, pls. 2 and 3.
Carbonia n. g.

—— Notes on the Palæozoic Entomostraca. No. 13. *Entomis serrato-striata* and others of the so-called Cypridinen of the Devonian schist of Germany.
In Annals Mag. Nat. Hist., 5th series, London, 79, p. 182, pl. 11.

—— Notes on some Palæozoic Entomostraca.
In Geol. Mag., decade 3, vol. 8, 1881, p. 337, 2 pls.
Cypridina?, *Cyprosis*, *Leperditia?*, *Entomis*, *Primitia*, *Beyrichia*, *Cyprosina* n. g., *Polycope*.

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—— and **Schmidt** (F.) On some Silurian *Leperditia*.
In Annals Mag. Nat. Hist., 5th series, London, vol. 9, 1882, p. 168.

—— Notes on some Palæozoic bivalved Entomostraca. No. 15.
In Annals Mag. Nat. Hist., 5th series, London, vol. 10, 1882, p. 358, figs. 1 a, b.
Primitia.

—— Notes on the Palæozoic bivalved Entomostraca. No. 16. 1. Some Palæozoic and other bivalved Entomostraca from Siberian Russia, pl. 6. 2. Some Palæozoic bivalved Entomostraca from Spitzbergen, pl. 9.
In Annals Mag. Nat. Hist., 5th series, London, vol. 12, 1883, p. 243, pls. 6 and 9.
Entomis, *Leperditia*, *Estheria*, *Primitia*.

—— Notes on the late Mr. Tate's specimens of the Lower Carboniferous Entomostraca from Berwickshire, Northumberland.
In Proc. Berw. Nat. Club, vol. 10, 1884, 1 pl.
Candona?, *Bernix*, *Carbonia*, *Macrocypsis?*, *Leperditia*, *Beyrichia*, *Kirkbya*, *Cythere*, *Cytherella*, *Estheria*, *Darwinella?*.

Jones (T. Rupert)—Continued.

—— Notes on the Palæozoic bivalved Entomostraca. No. 17. Some North American *Leperditia* and allied forms.

In Annals Mag. Nat. Hist., 5th series, London, vol. 14, 1884, p. 339.

Leperditia, *Isochilina*, *Primitia*.

—— Report of the committee, consisting of Mr. R. Etheridge, Dr. H. Woodward, and Prof. T. Rupert Jones (secretary), on the fossil *Phyllopoda* of the Palæozoic rocks.

In Rept. 53d Meeting Brit. Asso. Adv. Sci., 1883, p. 215.

Hymenocaris, *Caryocaris*, *Lingulocaris*.

—— Second report of the committee consisting of Mr. R. Etheridge, Dr. H. Woodward, and Prof. T. Rupert Jones (secretary), on the fossil *Phyllopoda* of the Palæozoic rocks.

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In Geol. Mag., n. s., decade 3, vol. 1, 1884, p. 356, pl. 12.

Leperditia, *Beyrichia*, *Carbonia*, *Candona?*, *Cythere*, *Estheria*, *Leaia*, *Primitia* or *Beyrichia*.

—— and **Woodward** (Henry). On some Palæozoic Phyllopoda.

In Geol. Mag., n. s., decade 3, vol. 1, 1884, p. 348.

Discinocaris, *Spathiocaris*, *Pholadocaris*, *Lisgocaris*, *Ellipsocaris*, *Cardiocaris*, *Dipterocaris*, *Pterocaris*, *Crescentilla*, *Aptychopsis*, *Peltocaris*, *Pinnocaris*.

—— Notes on the Palæozoic bivalved Entomostraca. No. 18. Some species of the Entomididæ.

In Annals Mag. Nat. Hist., 5th series, London, vol. 14, 1884, p. 391, pl. 15.

Entomis, *Bolbozoe*, *Entomidella*.

—— and **Woodward** (Henry). Notes on the British species of Ceratiocaris.

In Geol. Mag., n. s., decade 3, vol. 2, 1885, p. 385, pl. 10. Continued, ibid., p. 460.

—— **Kirkby** (J. W.) Notes on Palæozoic bivalved Entomostraca. No. 19. On some Carboniferous species of the Ostracodous genus *Kirkbya*.

In Annals Mag. Nat. Hist., 5th series, London, vol. 15, 1885, p. 174, pl. 3.

—— and **Holl** (H. B.) Notes on the Palæozoic bivalved Entomostraca. No. 20. On the genus *Beyrichia* and some new species.

Jones (T. Rupert) and **Holl** (H. B.)—Continued.

In Annals Mag. Nat. Hist., 5th series, London, vol. 17, 1886, p. 337, pl. 12.

Beyrichia, *Bollia* n. g., *Klœdenia* n. g.

—— —— Notes on the Palæozoic bivalved Entomostraca. No. 21. On some Silurian genera and species.

In Annals Mag. Nat. Hist., 5th series, London, vol. 17, 1886, p. 403, pls. 13, 14.

Strepula n. g., *Bollia*, *Placentula* n. g., *Primitia*.

—— and **Kirkby** (J. W.) Notes on the distribution of the Ostracoda of the Carboniferous formation of the British Isles.

In Abstracts Proc. Geol. Soc. London, session 1885–'86, No. 489, p. 86.

—— —— On Carboniferous Ostracoda from the Gayton borings, Northamptonshire.

In Geol. Mag., n. s., decade 3, vol. 3, London, 1886, p. 248, pl. 7.

Kirkbya, *Bythocypris*, *Macrocypris*, *Cytherella*.

—— —— Notes on the Palæozoic bivalved Entomostraca. No. 22. On some undescribed species of British Carboniferous Ostracoda.

In Annals Mag. Nat. Hist., 5th series, London, vol. 18, 1886, p. 249, pls. 6–9.

Bythocypris, *Cythere?*, *Leperditia*, *Beyrichia*, *Primitia?*, *Beyrichiella?*, *Kirkbya*, *Moorea*, *Cytherella*, *Bathocythere*, *Argillœcia*, *Aglaia?*, *Xestoleberis?*, *Macrocypris*, *Carbonia*, *Bairdia*.

—— —— On some fringed and other Ostracoda from the Carboniferous series.

In Geol. Mag., n. s., decade 3, vol. 3, London, 1886, p. 434, pls. 11, 12.

Beyrichiopsis n. g., *Beyrichiella* n. g., *Beyrichia*.

—— On Palæozoic Phyllopoda.

In Geol. Mag., n. s., decade 3, vol. 3, London, 1886, p. 456.

Ceratiocaris.

—— —— Notes on the distribution of the Ostracoda of the Carboniferous formations of the British Isles.

In Quart. Jour. Geol. Soc. London, vol. 42, 1886, p. 496.

Beyrichiopsis, *Phreatura* n. g., *Youngia* n. g. This generic name was used for a new genus of Trilobites by Lindström in 1885.

Note.—Since this paper was read many of the species have been described and figured in the Annals Mag. Nat. Hist. for October, 1886, and in the Geol. Mag. of the same date. Others in the Proc. Geologist Assoc., vol. 9, 1886.

—— Fourth report of the committee, consisting of Mr. R. Etheridge, Dr. H.

Jones (T. Rupert)—Continued.

Woodward, and Prof. T. Rupert Jones (secretary), on the fossil Phyllopoda of the Palæozoic rocks, 1886.

In Rept. 56th Meeting Brit. Assoc. Adv. Sci., 1886, p. 229.

Ceratiocaris, Emmelezoe, Xiphocaris, Physocaris, Cryptozoe.

—— and **Kirkby** (James W.) A list of the genera and species of bivalved Entomostraca found in the Carboniferous formations of Great Britain and Ireland. With notes on the genera and their distribution.

In Proc. Geologist Assoc., vol. 9, 1886, p. 495.

I. Cypridinidæ: 1. *Cypridina*, 2. *Cypridinella*, 3. *Cypridellina*, 4. *Cypridella*, 5. *Sulcuna*, 6. *Cyprella*, 7. *Bradycinetus*, 8. *Philomedes*, 9. *Rhombina*. II. Entomoconchidæ: 1. *Entomoconchus*, 2. *Offa*. III. Polycopidæ: 1. *Polycope*. IV. Entomididæ: 1. *Entomis*. V. Cytherellidæ: 1. *Cytherella*. VI. Leperditiidæ: 1. *Leperditia*, 2. *Bernix*, 3. *Beyrichia*, 4. *Beyrichiella*, 5. *Beyrichiopsis*, 6. *Kirkbya*, 7. *Moorea*, 8. *Phreatura*. VII. Cyprididæ: 1. *Aglaia*, 2. *Candona*, 3. *Argillœcia*, 4. *Macrocypris*, 5. *Bythocypris*, 6. *Bairdia*. VIII. Dawinulidæ: 1. *Dawinula*. IX. Cytheridæ: 1. *Cythere*, 2. *Xestoleberis*, 3. *Bythocythere*, 4. *Carbonia*, 5. *Youngia*.

——, **Etheridge** (R.) and **Woodward** (H.) Fifth report of the committee, consisting of Mr. R. Etheridge, Dr. H. Woodward, and Prof. T. Rupert Jones (secretary), on the fossil Phyllopoda of the Palæozoic rocks, 1887.

In Rept. 57th Meeting Brit. Assoc. Adv. Sci., 1887, p. 60.

Ceratiocaris, Dithyrocaris, Leaia, Estheria.

—— Notes on the Palæozoic bivalved Entomostraca. No. 23. On some Silurian genera and species (continued).

In Annals Mag. Nat. Hist., 5th series, London, vol. 19, 1887, p. 117, pls. 4-7.

Macrocypris, Pontocypris, Bythocypris, Cythere, Cytherella, Primitia.

Prof. T. Rupert Jones remarks in this paper: "Now that not only *Cythere* but its allied genera have been fully elucidated in the living state, it is found that the genus does not comprehend many of the fossil forms once referred to it. Whether these really belong to the *Cytheridæ* or to the *Cyprididæ* it is often difficult to say; but the genus *Cythere* comprises very few of the smooth subovate forms, and none that have toothless hinges. Hence we find that a real *Cythere* is scarcely known in Palæozoic strata."

—— Notes on the Palæozoic bivalved Entomostraca. No. 24. On some Silurian genera and species (continued).

In Annals Mag. Nat. Hist., 5th series, London, vol. 19, 1887, p. 400, pls. 12, 13.

Thlipsura, Octonaria n. g., *Bollia, Primitia, Moorea, Xestoleberis, Achmina.*

—— Notes on some Silurian Ostracoda from Gothland. Stockholm, 1887, 8 pp.

Beyrichia, Leperditia, Primitia, Primitiopsis n. g., *Macrocypris, Bythocypris, Thlipsura, Achmina, Bursulella* n. g.

—— Notes on the Palæozoic bivalved Entomostraca. No. 25. On some Silurian Ostracoda from Gothland.

In Annals Mag. Nat. Hist., 6th series, London, vol. 1, 1888, p. 395.

Beyrichia, Leperditia, Entomis, Primitia, Primitiopsis n. g., *Macrocypris, Bythocypris, Thlipsura, Achmina, Bursulella* n. g.

—— Notes on the Palæozoic bivalved Entomostraca. No. 26. On some new Devonian Ostracoda, with a note on their geological position, by the Rev. G. F. Whidborne.

In Annals Mag. Nat. Hist., 6th series, London, vol. 2, 1888, p. 295, 1 pl.

Kyamodes n. g.

—— and **Woodward** (Henry). A monograph of the British Palæozoic Phyllopoda (Phyllocarida, Packard).

In Palæont. Soc. London, vol. 41, 1887, pt. 1.

Ceratiocaridæ.

—— —— On some Scandinavian Phyllocaridæ.

In Geol. Mag., n. s., decade 3, vol. 5, London, 1888, p. 97, pl. 5.

Ceratiocaris.

—— *and others.* Sixth report of the committee, consisting of Mr. E. Etheridge, Dr. H. Woodward, and Prof. T. Rupert Jones (secretary), on the fossil Phyllopoda of the Palæozoic rocks, 1888.

In Rept. 58th Meeting Brit. Assoc. Adv. Sci., 1888.

Ceratiocaris, Echinocaris, Equisitides, Elymocaris, Tropidocaris, Mesothyra, Dithyrocaris, Rhinocaris, Spathiocaris, Dipterocaris, Estheria, Hymenocaris, Saccocaris, Lingulocaris, Bactropus, Schizodiscus.

Author's edition, 9 pp. and 9 wood-cuts.

—— and **Woodward** (Henry). See **Woodward** (Henry) and **Jones** (T. Rupert).

—— See **Schmidt** (Fr.) and **Jones** (T. Rupert).

Jordan (H.) Ueberreste eines kleinen überaus merkwürdigen Crustacees.

Jordan (H.)—Continued.

In Verhandl. natur. Vereins preussischen Rheinlande, Jahrg., vol. 4, 1847, p. 89, pl. 2, figs. 1, 2.

Gampsonyx (von Meyer) n. g.

—— and **Meyer** (H. von). Ueber die Crustaceen der Steinkohlenformation von Saarbrücken. Cassel, 1854, 2 pls.

Gampsonyx, *Adelophthalmus* (*Eurypterus*), *Chonionotus*, *Arthropleura*.

Jukes (F.) and **Sowerby** (J. D. C.) An account of a new species of Trilobite found in the Barr limestone in the neighborhood of Birmingham, by Frederick Jukes, with a note by J. D. C. Sowerby.

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(*Bumastes barriensis*), *Asaphus*, *Calymene*.

Karsten (Gustav). Die Versteinerungen des Uebergangs-Gebirges in den Geröllen der Herzogthümer Schleswig und Holstein. Kiel, 1869, 25 pls.

Olenus, *Proetus*, *Cyphaspis*, *Phacops*, *Calymene*, *Lichas*, *Trinucleus*, *Ampyx*, *Asaphus*, *Isotelus*, *Ceraurus*, *Sphærexochus*, *Encrinurus*, *Nileus*, *Agnostus*, *Beyrichia*, *Cythere*.

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—— Die Fauna der ältesten Devonbildungen des Harzes.

In Abhandlungen zur geologischen Specialkarte von Preussen und den thüringischen Staaten. Vol. 2, pt. 4. Berlin, 1878. Atlas, 36 pls.

Harpes, *Proetus*, *Cryphæus*, *Cyphaspis*, *Phacops*, *Dalmanites*, *Lichas*, *Acidaspis*, *Bronteus*, *Primitia*, *Dithyrocaris*.

—— Ueber *Dalmanites rhenanus*, eine Art der *Hausmanni*-Gruppe, und einige andere Trilobiten aus den älteren rheinischen Dachschiefern.

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Phacops, *Cryphæus*, *Dalmanites*.

—— *Dechenella*, eine devonische Gruppe der Gattung *Phillipsia*.

In Zeitschr. Deutsch. geol. Gesell., vol. 32, 1880, p. 703, pl. 27.

Dechenella n. g.

—— Beiträge zur Kenntniss von Oberdevon und Culm am Nordrande des rheinischen Schiefergebirges; Arten aus dem Culm von Aprath.

Kayser (Emanuel)—Continued.

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Cythere nebracensis.

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Proetus, *Phacops*, *Calymene*, *Lichas*, *Ampyx*, *Asaphus*, *Ptychopyge*, *Illænus*, *Acidaspis*, *Cheirurus*, *Encrinurus*, *Beyrichia*, *Leperditia*, *Primitia*, *Cytherellina*.

—— Ueber gotländische *Beyrichien*.

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Dithyrocaris, *Palæocrangon*, *Ceratiocaris*, *Rostrocaris* n. g.

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—— On Permian Entomostraca from the shell limestone of Durham. With notes on the species by T. Rupert Jones.

Kirkby (J. W.)—Continued.

In Annals Mag. Nat. Hist., 3d series, London, vol. 2, 1858, p. 317, 4 pls.

Kirkbya, *Cytheridæ*, *Cythere*, *Bairdia*.

—— and **Jones** (T. Rupert). On Permian Entomostraca.

In Trans. Tyneside Nat. Field Club, vol. 4, 1859, p. 122, 4 pls.

See, also, **Jones** (T. Rupert) and **Kirkby** (J. W.), and **Jones** (T. Rupert), **Kirkby** (J. W.), and **Brady** (M. P.).

—— On the Permian rocks of South Yorkshire and their Palæontological relations.

In Quart. Jour. Geol. Soc. London, vol. 17, 1861, p. 287.

Cythere (*Bairdia*), *Kirkbya*.

—— On some additional species that are common to the Carboniferous and Permian strata.

In Annals Mag. Nat. Hist., 3d series, London, vol. 10, 1862, p. 202.

Kjerulf (Theo.) Veiviser ved geologiske Exkursioner i Christiania og Omegn. Christiania, 1865.

The author herein gives a list of Norwegian Silurian fossils, with some notes and figures on the genera *Ceratopyge*, *Cyrtometopus*, *Illænus*, *Phacops*.

Klein (J. T.) Specimen descriptionis petrefactorum Gedanensium order Oryctographia Gedannensis, etc. (*)

In Nuremberg, 1770, folio, pl. 15, figs. 5–7.

Calymene blumenbachii.

Klöden (K. F.) Die Versteinerungen des Mark Brandenburg, etc. Berlin, 1834, 10 pls.

Cytherina phaseolus Calymene blumenbachii, *C.* var. *tuberculata*, *C.* var. *pulchella*, *C. sclerops*, *C. punctata*, *C. concinna*, *C. polytoma?*, *Asaphus extenuatus?*, *A. angustifrons*, *A. expansus*, *A. auriculatus*, *A. dilatatus*, *A.* (*Illænus*) *crassicauda*, *A.* (*Ampyx*) *nasutus?*, *A. caudatus*, *Battus pisiformis*, *B. tuberculatus*, pl. 1, figs. 16–23. F. McCoy, "Brit. Pal. Rocks," p. 135, remarks on this species that the name *Beyrichia tuberculatus* is generally applied to fig. 22 of Klöden's plate, which is a common form in the Gothland beds); *Battus gigas*, pl. 2, fig. 1.

Koch (C.) Monographie der Homalonotus-Arten des rheinischen Unterdevon.

In Preuss. geol. Landesanstalt, Abhandl., Berlin, 1883, vol. 4, pt. 2.

Koenen (A. von). Die Kulm-Fauna von Herborn.

In Neues Jahrbuch für Mineral., 1879, p. 309, pls. 6, 7.

Phillipsia, *Proetus*.

Koenen (A. von)—Continued.

—— Ueber die Unterseite der Trilobiten.

In Neues Jahrbuch für Mineral., 1880, vol. 1, p. 429, pl. 8, figs. 9, 10.

Phacops, *Asaphus*, *Calymene*.

—— Ueber Clymenienkalk und Mittel-Devonien bei Montpellier.

In Neues Jahrbuch für Mineral., 1886, p. 163.

Deckenella escoti.

Kolmodin (Lars). Bidrag till kännedomen om Sveriges Siluriska Ostracoder.

In Akad. Afhandling som med tillstånd af Tidtberömda Filosofiska Fakultetens i Upsala, etc., 1869, 1 pl.

Leperditia, *Beyrichia*, *Cytheropsis*, *Elpe*.

—— Ostracoda Silurica Gotlandiæ enumerat.

In Öfversigt kongl. Vet. Akad. Förhandlingar, 1879, No. 9, p. 133, pl. 19.

Leperditia, *Beyrichia*, *Elpe*.

König (C. E.) Icones fossilium sectiles.

Centuria prima, text, 4 pp., pls 1–8; Centuria seconda, pls. 9–19.; n. d.

The common edition of this work has only four pages of text and eight plates (London, 1820, 4to).

Calymene decipiens, p. 2, pl. 3, fig. 32 (*Ellipsocephalus hoffi*); *Asaphus myops*, p. 3, pl. 4, fig. 53; *Homalonotus* n. g., *H. knighti*, p. 4, pl. 7, fig. 85; *Agnostus*, pl. 10, figs. 119, 120; *Isotelus gigas*, pl. 10, fig. 121; *Asaphus extenuatus*, pl. 10, fig. 122; *A. crassicauda*, pl. 13, fig. 150; *Belinurus* n. g., *B. bellulus*, pl. 18, fig. 230.

For a description of the genus *Belinurus*, see W. H. Baily's article, Annals Mag. Nat. Hist., 3d series, London, vol. 11, 1863.

Koninck (L.-G. de). Mémoire sur les Crustacés fossiles de Belgique.

In Mém. Acad. Sci. Bruxelles, vol. 14, 1841, 1 pl.

Goldius n. g., *Asaphus*, *Cyclus* n. g., *Cytherina*, *Cypridina*, *Cyprella* n. g. (*Phillipsia* and *Bronteus*).

—— Description des animaux fossiles qui se trouvent dans le terrain carbonifère de Belgique. Liège, 1842–'44.

Cythere, *Cypridina*, *Cyprella*, *Cypridella* n. g., *Cyclus*, *Phillipsia brongniarti*, *P. globiceps*, *P. derbyensis*, *P. gemmulifera*, *P. pustulata*, *P. jonesii*.

—— Recherches sur les fossiles palæozoïques de la Nouvelle-Galles du Sud Australie.

In Mém. Soc. Sci. Liège, 2d series, vol. 6, 1877.

Illænus, *Staurocephalus*, *Cheirurus Encrinurus*, *Cromus*, *Calymene*, *Proetus*, *Lichas*, *Bronteus*, *Harpes*.

Koninck (L.-G. de)—Continued.

—— Recherches sur les fossiles palæozoïques de la Nouvelle-Galles du Sud Australie.

In Mém. Soc. Sci. Liège, 2d series, vol. 7, 1878.
Phillipsia, Griffithides, Brachymetopus.

—— Sur une nouvelle espèce de crustacé du terrain houiller de la Belgique.

In Bull. Acad. Sc. Bruxelles, 2d series, vol. 45, 1878, p. 409, 1 pl.
Brachypyge carbonis.
The principal part of this article is a letter from Dr. Henry Woodward to L. G. de Koninck.

—— Notice sur le *Prestwichia rotundata* J. Prestwich, découvert dans le schiste houiller de Horme, près Mons.

In Bull. Acad. Sci. Bruxelles, 3d series, vol. 1, 1881, p. 91, 1 pl.

Krause (A.) Die Fauna der sogen. Beyrichien oder Choneten-Kalke des norddeutschen Diluviums.

In Zeitschr. Deutsch. geol. Gesell., vol. 29, Berlin, 1877, p. 1, 1 pl.
Oalymene blumenbachii, Phacops downingæ, Proetus concinus, Leperditia, Beyrichia, Cytherellina, Primitia.

Kuntgen (K.) Die Trilobiten. (*)

In Mus. Luxemburg, 1877.

Kutorga (S.) Beiträge zur Kenntn. der organischen Ueberreste des Kupfersandst. am westl. Abhange des Urals. St. Petersburg, 1838, p. 22, pl. 4, figs. 1–3.

Limulus oculatus Kutorga.
Édouard d'Eichwald ("Lethæa Rossica," vol. 1, p. 1360) uses this species for a type of his new genus, *Oompylocephalus.*

—— Ueber einige baltische silurische Trilobiten.

In Verhandl. russ. k. mineral. Gesell. zu St. Petersburg, 1847, p. 287, plate.
Asaphus, Illænus, Encrinurus.

—— Einige *Sphærexochus* und *Cheirurus* aus den silurischen Kalksteinschichten dés Gov. St. Petersburg.

In Verhandl. russ. k. mineral. Gesell. zu St. Petersburg, 1854, p. 105, 3 pls.
Oheirurus gembnitzkii, C. macrophthalmus, Sphærexochus cranium, S. hemicranium, S. platycranium, S. enurus.

Lang (C. N.) Historia lapidum figuratorum Helvetia ejusque vicinæ in qua enarrantur omnia eorum genera, species et vires. Venetiis, 1708. (*)

—— Tractatus de origine lapidum figuratorum Helvetiæ. Lucernæ, 1709. (*)

Laspeyres (H.) Das fossile Phyllopoden-Genus *Leaia.*

In Zeitschr. Deutsch. geol. Gesell., Berlin, 1870, p. 733, 1 pl.

Latreille (P.-A.) Affinités des Trilobites.

In Mém. Mus. Hist. Nat., Bruxelles, vol. 7, 1821, p. 22; Annals Sci. Phys., Bruxelles, vol. 6.

Lawrow (N.) Zwei neue Asaphus-Arten aus dem silurischen Kalksteine.

In Verhandl. russ. k. mineral. Gesell. zu St. Petersburg, 1855–'56, p. 237, pls. 4, 5.

—— *Ptychopyge* und *Megalaspis,* Trilobiten der unter-silurischen Kalksteine.

In Verhandl. russ. k. mineral. Gesell. zu St. Petersburg, 1857–'58, p. 146, plate.

Lebesconte (M.-P.) Constitution générale du massif breton comparée à celle du Finistère.

In Bull. Soc. Géol. France, 3d series, vol. 14, 1886, p. 776, pls. 34–36.
Homalonotus barroisi, H. heberti, Ogygites.

Lehmann (J. G.) Versuch einer Geschichte von Flötzgebirgen betreffend deren Entstehung, Lage, darin befindlichen Metalle, Mineralien und Fossilien. Berlin, 1756. (*)

—— De Entrochis et Asteriis. (*)

In Novi Comm. Sci. Petropol., vol. 10, 1764, p. 429, par. 12, par. 12, figs. 8–10.

Leuchtenberg (M. H. von). Beschreibung einiger neuer Thierreste der Urwelt von Zarskoje-Selo. St. Petersburg, 1843, 2 pls.

Asaphus, Nileus, Metopias.

Lhwyd (Edward). Part of a letter from Mr. Edward Lhwyd to Doctor Martin Lister.

In Philos. Trans. Royal Soc. London, vol. 20, No. 243, 1698, p. 299, plate, figs. 8, 9, and 10.
This paper contains the earliest account of Trilobites. The author discovered two fragments and one entire specimen of *Ogygia buchii* near Llandeilo, in Carmarthenshire. Lhwyd says in his letter that he did not know what to make of these fossils. The *Ogygia* (fig. 10) he refers to the skeleton of an unknown fish. Fig. 8 represents the head of a species of the genus *Trinucleus.*

—— Lithophylacii Britannici Ichnographia. Londini, 1699, 23 pls.; 2d ed., 1760.

This work gives a catalogue of English fossils contained in the Ashmolean Museum, and also several essays on fossils. In the author's article "Epistola I. de lapidibus quibusdam Germania acceptis," pp. 95–100, he alludes to an *Ogygia,* and remarks: "This ichthyomorphous stone swims spread out on its side, although it

Lhwyd (Edward)—Continued.

does not correspond to any specimen heretofore discovered; it does not agree in its external outline to your fossil, but represents the skeleton of the same or of a sole, only the specimen is striated on the circumference. The figure belongs to *Buglossium*, or the sole fish, except it is somewhat larger and less compressed at its extremities, but it wants the tail of a fish. We call it *Buglossam curtam strigosam.*" He also gives a description and figure of *Trinucleus fimbriatum vulgare*, pl. 22, 23, on which R. I. Murchison afterwards founded the genus *Trinucleus.*

Lindaker (T. J.) Beschreibung einer noch nicht bekannten Käfermuschel. (*)

In Mayer's Sammlung phys. Aufsätze, Dresden, vol. 1, 1791, p. 37, pl. 1.

The author describes under the name of "gegitterte Käfermuschel" a *Trinucleus* from Prague.

Lindström (G.) Normina fossilium Siluriensium Gotlandiæ Laroverks program. Visby, 1867.

Proetus, Phacops, Calymene, Homalonotus, Lichas, Acidaspis, Trapelocera, Cheirurus, Deiphon, Sphærexochus, Cryptonymus, Bronteus, Bumastus, Eurypterus, Pterygotus, Ceratiocaris, Beyrichia, Leperditia, Cytheropsis.

—— List of the fossils of the Upper Silurian formation of Gothland. Stockholm, 1885.

—— Förteckning på Götland Siluriska Crustacéer.

In Öfversigt. Kongl. Vet. Akad. Förhandlingar, 1885, No. 6, p. 37, pls. 12–16.

Harpes, Proetus, Cyphaspis, Phætonides, Phacops, Calymene, Homalonotus, Lichas, Trochurus, Acidaspis, Cheirurus, Sphærexochus, Youngia n. g., *Deiphon, Encrinurus, Illænus, Bronteus, Eurypterus.*

Linnarsson (J. G. O.) Om de Siluriska bildningarne i Mellersta Westergötland. 1.

In Akad. Afhandling som med tillstånd af Vidtberömda Filosofiska Fakulten i Upsala, etc., 1866, 2 pls.

The Trilobites are grouped as follows: Phacopidæ: *Phacops.* Cheiruridæ: *Pliomera, Cyrtometopus, Sphærexochus.* Encrinuridæ: *Cybele.* Acidaspidæ: *Acidaspis.* Lichidæ: *Lichas.* Harpedidæ: *Arraphus.* Calymenidæ: *Calymene, Homalonotus.* Aulacopleuridæ: *Aulacopleura.* Liostracidæ: *Liostracus.* Olenidæ: *Paradoxides, Olenus, Peltura, Parabolina, Eurycare, Sphærophthalmus.* Remopleurideæ: *Remopleurides.* Proetidæ: *Forbesia.* Asaphidæ: *Asaphus, Megalaspis, Ptychopyge, Ogygia ?, Niobe.* Illænidæ: *Illænus, Rhodope, Nileus, Symphysurus, Æglina.* Trinucleidæ: *Trinucleus, Ampyx, Lonchodomas, Raphiophorus, Dionide.* Agnostidæ: *Agnostus.* *Incertæ sedis*: *Holometopus.*

Linnarsson (J. G. O.)—Continued.

The author also gives descriptions and figures of the following species: *Phacops pulchellus, Cyrtometopus latilobus, Sphærexochus laticeps, Lichas segmentatus, Ogygia ? apiculata, Illænus limbatus, Agnostus affinis.*

—— Om Vestergötlands Cambriska och Siluriska Aflagringar.

In Kongl. Svenska Vet.-Akad. Handl., vol. 8, No. 2, 1869, 2 pls.

Harpes, Remopleurides, Paradoxides, Dikelocephalus, Olenus, Triarthrus, Ceratopyge, Conocoryphe, Anomocare, Arionellus, Liostracus, Euloma, Holometopus, Proetus, Harpides, Phillipsia, Phacops, Calymene, Homalonotus, Lichas, Trinucleus, Ampyx, Dionide, Asaphus, Megalaspis, Symphysurus. Stygina, Ogygia, Niobe, Æglina, Acidaspis, Cheirurus, Sphærexochus, Staurocephalus, Pliomera, Cybele, Encrinurus, Dindymene, Nileus, Panderia, Agnostus, Leperditia, Beyrichia, Primitia.

—— Diagnoses specierum novarum e classe Crustaceorum in depositis Cambrisis et Siluricis Vestrogotiæ Sueciæ repertarum.

In Öfversigt. Kongl. Svenska Vet.-Akad. Förhandl., 1869, No. 1, p. 191.

Remopleurides, Triarthrus, Phacops, Trinucleus, Symphysurus, Ogygia, Niobe. Acidaspis, Cheirurus, Cybele, Dindymene, Panderia, Agnostus, Lichas, Leperditia, Beyrichia, Primitia, Trilobites ænigma.

—— Jemförelse mellan de Siluriska aflagringarne i Dalarne och i Vestergötland.

In Öfversigt. Kongl. Svenska Vet.-Acad. Förhandl., 1871, No. 3, p. 339.

Remopleurides, Trinucleus, Proetus, Phacops, Chasmops, Illænus, Nileus, Beyrichia, Primitia.

Mere mention of occurrence.

—— Om några försteningar från Sveriges och Norges "Primordialzon."

In Öfversigt Kongl. Svenska Vet.-Akad. Förhandl., 1871, No. 6.

Paradoxides kjerulfi, pl. 16, figs. 1–3.

—— Anteckningar om den Cambrisk-Siluriska lagerserien Jemtland.

In Geol. Föreningens Stockholm Förhandl., vol. 1, No. 3, 1872, p. 34.

—— Öfversigt af Nerikes öfvergångsbildningar.

In Öfversigt Kongl. Svenska Vet.-Akad. Förhandl., 1875, No. 5, pl. 5; Sveriges Geologiska Undersökning Ser. C, No. 21, 1875.

Paradoxides, Ellipsocephalus, Leptoplastus n. g., *Beyrichia.*

—— Trilobiter från Vestergötlands Andrarum kalk.

In Geol. Föreningens Stockholm Förhandl., vol. 2, 1875, p. 491.

Linnarsson (J. G. O.)—Continued.

—— En egendomlig Trilobitfauna från Jemtland.

In Geol. Föreningens Stockholm Förhandl., vol. 2, No. 12, 1875, p. 491, pl. 22, figs. 1-5.

Dicellocephalus billingsi, Triarthrus jemtlandicus, Remopleurides microphthalmus, Bohemilla (?) *denticulata.*

—— Två nya Trilobiter från Skånes alumskiffer.

In Geol. Föreningens Stockholm Förhandl., vol. 2, No. 12, 1875, p. 498.

Liostracus (?) *superstes, Cyclognathus* n. g., *C. micropygus.*

—— Geologiska iakttagelser under en resa på Öland.

In Geol. Föreningens Stockholm Förhandl., vol. 3, No. 2, 1876, p. 71.

—— Om faunan i lagren med *Paradoxides ölandicus.*

In SverigesGeologiska Undersökning, Ser. C, No. 22, 1877, 2 pls.

Paradoxides, Ellipsocephalus, Conocoryphe, Agnostus.

—— Om de palæozoiska bildningarna vid Humlenäs.

In Sveriges Geologiska Undersökning, Ser. C, No. 28, 1878.

—— On the Trilobites of the Shineton shales.

In Geol. Mag., new series, decade 2, vol. 5, 1878, p. 188.

Conocoryphe, Remopleurides.

—— Om faunan i kalken med *Conocoryphe exsultans.*

In Sveriges Geologiska Undersökning, Ser. C, No. 35, 1879, 3 pls.

Paradoxides, Liostracus, Solenopleura, Conocoryphe, Agnostus.

—— Ceratopygekalk och undre graptolitskiffer på Falbygden, i Vestergötland.

In Geol. Föreningens Stockholm Förhandl., vol. 4, 1879, p. 269.

—— Om försteningarne i de Svenska lagren med Peltura och Sphærophthalmus.

In Geol. Föreningens Stockholm Förhandl., vol. 5, 1880, No. 4; Sveriges Geologiska Undersökning, Ser. C, No. 43, 1880.

Peltura, Sphærophthalmus, Anopocare, Ctenopyge n. g., *Agnostus.*

—— Promemoria lemnad af A. G. Nathorst för resa på Öland.

In Geol. Föreningens Stockholm Förhandl., vol. 5, No. 13, 1881.

—— De undre Paradoxides lagren vid Andrarum.

In Sveriges Geologiska Undersökning, Ser. C, No. 54, 1883, 4 pls.

Linné (C.) Ölandska och Gotländska resa. Stockholm och Upsal, 1745.

On p. 147, under the name of *Entomolithus paradoxus*, there is in this work a rough woodcut of the pygidium of *Asaphus expansus* Linn.

—— Wästgöta resa förrattad år 1746. Stockholm, 1747.

On pp. 87 and 88 of this work there are some rough wood-cuts of Trilobites, probably an *Olenus* and the head of a *Paradoxides.*

—— Museum Tessinianum. Holmiæ, 1753, p. 123, pl. 3.

Entomolithus, pl. 3, fig. 2 (*Calymene tuberculatus*); E. paradoxus, pl. 3, fig. 1 (*Paradoxides tessini*).

—— Skanska resa. Stockholm, 1757, p. 121.

—— Petrificatet Entomolithus paradoxus beskrifed.

In Acta Regiæ Acad. Sci. Holmiens., vol. 21, 1759, p. 19, pl. 1, figs. 1-4.

Entomolithus paradoxus, pl. 1, fig. 1 (*Olenus spinulosus*); Entom. paradoxus β cantharidum, pl. 1, fig. 4, head (*Olenus gibbosus*); Entom. No. 3, pl. 1, fig. 3 (*Calymene blumenbachii*); Entom. No. 2, pl. 1, fig. 2 (*Encrinurus punctatus*).

—— Systema naturæ. Ed. 12. Vol. 3. Holmiæ, 1768, p. 160.

Entomolithus paradoxus α expansus (*Asaphus expansus* Linn.). E. paradoxus β cantharidum (*Olenus gibbosus* Wahl.), E. paradoxus γ pisiformis (*Agnostus pisiformis* Linn.).

Littleton (Charles). On a nondescript petrified insect.

In Philos. Trans. Royal Soc. London, vol. 46, No. 496, 1750, p. 598, pl. 1, figs. 3-12, pl. 2.

Calymene blumenbachii.

Locke (John). On *Isotelus maximus*, found near Trebers, in Adams County, Ohio.

In Second Ann. Rept. Geol. Survey Ohio (W. W. Mather), 1838, p. 247, fig. 8.

—— On a new species of Trilobite of very large size.

In Trans. Assoc. Am. Geol. and Naturalists, vol. 1, 1843, p. 221, plate.

Isotelus megistos Locke.

Dr. John Locke has herein given a new name to the species which he called *Isotelus maximus* in the Second Ohio Report. See, also, Am. Jour. Sci., 1st series, vol. 42, 1843, p. 366, 1 pl.

—— Notice of a new Trilobite.

In Am. Jour. Sci., 1st series, vol. 44, 1843, p. 346.

Ceraurus crosotus.

—— Supplementary notice of the *Ceraurus crosotus.*

In Am. Jour. Sci., 1st series, vol. 45, 1843, p. 223.

Logan (W. E.) *Bronteus canadensis.*

In Rept. Geol. Survey Canada, 1844, p. 54, 2 figs.

—— On the tracks of an animal lately found in the Potsdam sandstone.

In Canadian Naturalist, vol. 5, 1860, p. 279.

Lossen (K. A.) Ueber *Cryphæus rotundifrons* aus dem *zorger* Schiefer des südlichen Unterharzes.

In Zeitschr. Deutsch. geol. Gesell., vol. 31, 1879, p. 215.

Cryphæus.

Lovén (S. L.) On *Calymene clavifrons* and *C. ovata.*

In Öfversigt Kongl. Svenska Vet.-Akad. Förhandl., 1845, p. 63.

—— Svenska Trilobiter.

In Öfversigt Kongl. Svenska Vet.-Akad. Förhandl., 1845, pp. 46, 104, pls. 1, 2.

Trinucleus, Proetus, Metopias, Lichas, Ceraurus, Cybele n. g.

Lungren (B.) Om den vid Ramsåsa och Öfveredskloster i Skåne forekommande sandstenens alder.

In Acta Univ. Lundensis, 1874.

Leperditia.

MacLeay (W. S.) Observations on Trilobites, founded on a comparison of their structure and that of living Crustacea.

In R. I. Murchison. "The Silurian system," London, 1839, p. 666; Annals Mag. Nat. Hist., 1st series, London, vol. 4, 1839, p. 16.

The author compares them with *Apus* and other *Aspidophora,* animals which, in his opinion, of all the *Entomostraca,* appear to come nearest to the *Trilobita.*

McCoy (Frederick). On *Entomoconchus scouli.*

In Jour. Geol. Soc. Dublin, vol. 11, 1839, p. 91, pl. 5, figs. a, c.

Entomoconchus n. g.

—— A synopsis of the characters of the Carboniferous limestone fossils of Ireland. Dublin, 1844, 29 pls.

The title-page bears no author's name. The book shows that it was prepared by Frederick McCoy, under the direction of Richard Griffith, the collector, in whose cabinet all the species were contained.

Phillipsia, Griffithides, Calymene, Dithyrocaris, Entomoconchus, Cytherina, Bairdia n. g., *Cythere, Daphina.*

—— A synopsis of the Silurian fossils of Ireland, collected from the several districts by Richard Griffith, F. G. S. The whole being named, and the new species drawn and described, by Frederick McCoy. Dublin, 1846, 5 pls.

Harpes, Remopleurides, Forbesia n. g., *Phacops, Portlockia* n. g., *Calymene, Homalonotus, Lichas, Trinucleus, Ampyx, Ogygia, Isotelus, Illænus, Acidaspis, Cheirurus, Sphærexochus, Otarion, Encrinurus, Bronteus, Trinodus* n. g., *Tiresias* n. g., *Beyrichia* n. g., *Cythere, Battus.*

A notice of the new genera described by Frederick McCoy is given in the Ray Society's edition of Burmeister's "Organization of Trilobites. Supplementary appendix," p. 123.

The generic name *Tiresias* was used in 1845 for a genus of the Coleoptera, and that of *Forbesia* for one of the Polypi in 1845. *Trinodus* was used in 1846 for a genus of the Coleoptera.

—— On the fossil botany and zoology of the rocks associated with the coal of Australia.

In Annals Mag. Nat. Hist., 1st series, London, vol. 20, 1847, p. 226, plate.

Phillipsia, Brachymetopus n. g., *Cythere, Bairdia.*

—— On the classification of some British fossil Crustacea, with notices of new forms in the University collection at Cambridge.

In Annals Mag. Nat. Hist., 2d series, London, vol. 4, 1849.

Asaphinæ: 1. *Phacops,* 2. *Calymene,* 3. *Trimerocephalus* n. g., 4. *Asaphus* (subgenera, *Isoletus, Basilicus*), 5. *Illænus* (subgenera, *Illænus, Bumastus, Dysplanus*). 6. *Forbesia,* 7. *Phillipsia.* Paradoxinæ: 1. *Paradoxides* (subgenus, *Olenus*), 2. *Ceraurus,* 3. *Cryphæus,* 4. *Sphærexochus,* 5. *Acidaspis,* 6. *Staurocephalus,* 7. *Remopleurides,* 8. *Zethus.* Ogyginæ: 1. *Trinucleus* (subgenus, *Tetrapsellium*), 2. *Tretaspis* n. g., 3. *Ampyx,* 4. *Ogygia,* 5. *Bronteus,* 6. *Lichas* (subgenera, *Trochurus, Acanthopyge*). Harpedinæ: 1. *Harpes,* 2. *Harpidella* n. g., 3. *Amphion.* Agnostinæ: 1. *Trinodus,* 2. *Agnostus, Chasmops* n. g., *Griffithides, Barrandia* n. g., *Ceratiocaris* n. g., *Cytheropsis* n. g., *Pterygotus.*

Partly republished in the author's "Contributions to British Palæontology, etc.," London, 1854.

—— On the supposed fish remains figured on plate 4 of "The Silurian system."

In Quart. Jour. Geol. Soc. London, vol. 9, 1853, p. 13.

—— A synopsis of the classification of the British Palæozoic rocks, by Adam Sedgwick; with a systematic description of the British Palæozoic fossils in the Geological Museum of Cambridge, by Frederick McCoy, with figures of the new and imperfectly known species. London and Cambridge, 1855, 25 pls. Pt. 2. Palæontology.

McCoy (Frederick)—Continued.

Fasciculus 1. Radiata and Articulata. London, 1851.

Fasciculus 2. Lower and Middle Palæozoic Mollusca. London, 1852.

Fasciculus 3. Upper Palæozoic Mollusca and fish. London and Cambridge, 1855.

Harpes, *Forbesia*, *Phacops*, *Odontochile*, *Chasmops*, *Portlockia*, *Calymene*, *Homalonotus*, *Trochurus*, *Lichas*, *Trinucleus*, *Harpidella*, *Tretaspis*, *Ampyx*, *Isotelus*, *Ogygia*, *Barrandia*, *Acidaspis*, *Ceraurus*, *Eccoptochile*, *Staurocephalus-Encrinurus*, *Zethus*, *Illænus*, *Dysplanus*, *Diplorhina*, *Agnostus*, *Acanthopyge*, *Eurypterus*, *Pterygotus*, *Leptocheles* n. g., *Ceratiocaris*, *Beyrichia*, *Cytheropsis*, *Trinodus*.

—— Contributions to British palæontology, or first description of 360 species and several genera of fossil Radiata, Articulata, Mollusca and Pisces from the Tertiary, Cretaceous, Oolitic and Palæozoic strata of Great Britain. Republished from the Annals Mag. Nat. Hist. Cambridge, 1854.

For a list of the genera of fossil Crustacea, see entries under McCoy (Frederick), Annals Mag. Nat. Hist., 2d series, London, vol. 4, 1849.

—— Geological Survey of Victoria. Prodromus of the palæontology of Victoria, or figures and descriptions of Victorian organic remains, decade 3. Melbourne and London, 1875, pls. 22, 23.

Phacops (*Odontochile*) *caudatus*, *P.* (*Portlockia*) *fecundus*, *Forbesia euryseps* McCoy, *Lichas australis* McCoy, *Homalonotus harrisoni* McCoy.

Mantell (G.) Medals of creation, or first lessons in geology and the study of organic remains. 2 vols. London, 1854.

Marcou (Jules). On the Primordial fauna and the Taconic system, by Joachim Barrande; with additional notes by Jules Marcou.

In Proc. Boston Soc. Nat. Hist., vol. 7, 1861, p. 369.

—— Notice sur les gisements des lentilles trilobitifères taconique de la Pointe Lévis ou Canada.

In Bull. Soc. Géol. France, 2d series, vol. 21, 1864, p. 236.

Marr (J. E.) On some well-defined life zones in the lower part of the Silurian (Sedgwick) of the Lake District.

In Quart. Jour. Geol. Soc. London, vol. 34, 1878, p. 871.

Appendix. On some species of *Phacops*, p. 884.

Marr (J. E.)—Continued.

—— and **Nicholson** (H. A.) The Stockdale shales.

In Quart. Jour. Geol. Soc. London, vol. 44, 1888, p. 654, pl. 16.

Harpes, *Proetus*, *Phacops*, *Ampyx*, *Acidaspis*, *Cheirurus*.

Martin (D. S.) A new Eurypterid from the Catskill group.

In Trans. New York Acad. Sci., vol. 2, 1882, p. 8.

This notice was based upon a cast of *Stylonurus excelsior* Hall, obtained from the Museum of Natural History, Albany, New York.

Martin (W.) Petrificata Derbiensia: a description of petrifactions collected in Derbyshire. Wigan, 1809, 4to, 53 pls.

Entomolithus oniscites (*derbiensis*), pl. 45, figs. 1–3; *Entomolithus monoculites?* (*lunatus*), pl. 45, fig. 4; *Entom. paradoxus*, from Dudley, pl. 45. fig. 3; also pl. 45*x*, fig. 3.

These fossils have been referred to the following modern genera: *Phillipsia derbiensis*, pl. 45, figs. 1–3, and pl. 45*x*, fig. 3; *Belinurus*, pl. 45, fig. 4, *Calymene blumenbachi*, pl. 45, fig. 3.

Matthew (G. F.) Illustrations of the fauna of the St. John group. No. 1. The Paradoxides; their history.

In Trans. Royal Soc. Canada, vol. 1, 1882, Sec. 4, p. 87, pl. 9.

Paradoxides etemenicus Matt., *Par. acadicus* Matt., *P. lamellatus* Hartt.

—— Illustrations of the fauna of the St. John group. No. 1. The Paradoxides (supplementary section describing the parts).

In Trans. Royal Soc. Canada, vol. 1, 1882, Sec. 4, p. 271, pl. 10.

—— Illustrations of the fauna of the St. John group, continued: On the *Conocoryphea*, with further remarks on *Paradoxides*.

In Trans. Royal Soc. Canada, vol. 2, 1884, Sec. 4, p. 99, pl. 1.

Paradoxides, *Ctenocephalus*, *Conocoryphe*.

In his explanation of the plate, fig. 6, the author uses a new subgenus, *Ctenocephalus* (*Hartella*) *matthewi*, and also for fig. 22, *Conocoryphe* (*Bailiella*) *baileyi*.

—— An outline of recent discoveries in the St. John group.

In Bull. New Brunswick Nat. Hist. Soc., No 4, 1884.

—— Illustrations of the fauna of the St. John group. No. 3. Descriptions of new genera and species (including a description of a new species of Solenopleura, by J. F. Whiteaves).

In Trans. Royal Soc. Canada, vol. 3, 1885, p. 29, 3 pls.

Matthew (G. F.)—Continued.

Lepiditta n. g., *Lepidilla* n. g., *Beyrichia*, *Hipponicharion* n. g., *Beyrichona* n. g., *Primitia*, *Agnostus*, *Microdiscus*, *Agraulos*, *Solenopleura*, *Paradoxides*.

—— On the probable occurrence of the great Welsh *Paradoxides*, *P. davidis*, in America.

In Am. Jour. Sci., 3d series, vol. 30, 1885, p. 72; Nature, vol. 32, 1885, p. 358.

—— Abstract of a paper on the Cambrian fauna of Cape Breton and Newfoundland.

In Canadian Record Sci., vol. 2, 1886, p. 255.

—— Note on the occurrence of *Olenellus? kjerulfi* in America.

In Am. Jour. Sci., 3d series, vol. 31, 1886, p. 472.

—— On the Cambrian fauna of Cape Breton and Newfoundland.

In Trans. Royal Soc. Canada, vol. 2, 1886, p. 147.

Agraulos, *Selenopleura*.

—— Illustrations of the fauna of the St. John group. No. 4. On the smaller eyed Trilobites of Division 1, with a few remarks on the species of the higher division of the group.

In Canadian Record Sci., vol. 2, No. 6, 1887, p. 357.

—— On the kin of *Paradoxides* (*Olenellus?*) *kjerulfi*.

In Am. Jour. Sci., 3d series, vol. 33, 1887, p. 390.

—— The great Acadian Paradoxides.

In Am. Jour. Sci., 3d series, vol. 33, 1887, p. 388.

Paradoxides regina Matt.

—— Illustrations of the fauna of the St. John group. No. 4. Part 1. Description of a new species of *Paradoxides* (*P. regina*). Part 2. The smaller Trilobites with eyes (*Ptychoparidæ* and *Ellipsocephalidæ*).

In Trans. Royal Soc. Canada, vol. 5, 1887, p. 115, 3 pls.

Paradoxides, *Liostracus*, *Strenuella* n. subgen., *Ptychoparia*, *Solenopleura*, *Agraulos*, *Ellipsocephalus*.

Maurer (F.) Paläontologische Studien im Gebiet des rheinischen Devon. Die Fauna des Rotheisenstein der Grube Haina.

In Neues Jahrbuch für Mineral., 1875, p. 596, pl. 14.

Phacops latifrons, *Cyphaspis ceratophthalmus*.

Maurer (F.)—Continued.

—— Paläontologische Studien im Gebiet des rheinischen Devon. Die Thonschiefer des Ruppbachthales bei Diez.

In Neues Jahrbuch für Mineral., 1876, p. 808, pl. 14.

Phacops, *Acidaspis*, *Bronteus*.

—— Die Fauna der Kalke von Waldgirmes bei Giessen.

In Abhandl. grossh.-hess. geol. Landesanstalt zu Darmstadt, vol. 1, pt. 2, 1885, atlas of 11 pls.

Harpes, *Phacops*, *Proetus*, *Cyphaspis*, *Cheirurus*, *Bronteus*, *Primitia*, *Orozoe*.

Meek (F. B.) Note on *Belinurus danæ*, from the Illinois Coal Measures.

In Am. Jour. Sci., 2d series, vol. 43, 1867, p. 257; Geol. Survey Illinois, vol. 2, p. 395.

—— Note on a new genus of fossil Crustacea.

In Am. Jour. Sci., 2d series, vol. 43, 1867, p. 394; Geol. Survey Illinois, vol. 3, p. 547.

Euproops (n. g.).

—— Descriptions of fossils collected by the U. S. Geological Survey, under charge of Clarence King.

In Proc. Acad. Nat. Sci. Phila., vol. 22, 1870, p. 56.

Republished and illustrated in Rept. U. S. Geol. Expl., 40th Parallel, vol. 4, pt. 1, pp. 1-197, pls. 1-17.

Paradoxides, *Conocoryphe* (*Conocephalites*), *Olenus*.

—— Descriptions of new species of invertebrate fossils from the Carboniferous and Devonian rocks of Ohio.

In Proc. Acad. Nat. Sci. Phila., vol. 23, 1871, p. 57.

Republished and figured in "Palæontology of Ohio," vol. 1, 1873, p. 233, 23 pls.

Proetus planimarginatus, *Dalmanites ohioensis*.

—— Descriptions of new Western Palæozoic fossils, mainly from the Cincinnati group of the Lower Silurian series of Ohio.

In Proc. Acad. Nat. Sci. Phila., vol. 23, 1871, p. 308.

Redescribed and illustrated in "Palæontology of Ohio," vol. 2, 1875.

Cythere, *Ceratiocaris* (*Colpocaris*), *Archæocaris*, *Solenocaris*, *Colpocaris*. (Not *Solenocaris* Young, 1868.)

—— List of Carboniferous fossils from West Virginia, with descriptions of new species.

In Appendix B, Rept. of Regents of West Virginia Univ., 1870, Wheeling, 1871, p. 68.

Phillipsia stevensoni Meek.

—— Final report of the U. S. Geological Survey of Nebraska and portions of the

Meek (F. B.)—Continued.

adjacent Territories, by F. V. Hayden, etc. Report on the palæontology of eastern Nebraska, with some remarks on the Carboniferous rock of that district by F. B. Meek. Washington, 1871, p. 83, 11 pls. (Two editions: first in 8vo, second in 4to.)

Phillipsia, Cythere.

—— Genus *Archæocaris.*

In Proc. Acad. Nat. Sci. Phila., vol. 24, 1872, p. 325.

—— Description of new species of fossils from Cincinnati group, Ohio.

In Am. Jour. Sci., 3d series, vol. 3, 1873, p. 423.

Proetus, Dalmanites.

—— Preliminary palæontological report, consisting of list and descriptions of fossils, with remarks on the age of the rocks in which they are found, etc.

In Sixth Ann. Rept. U. S. Geol. Survey Territories, embracing portions of Montana, Idaho, Wyoming, and Utah, etc. F. V. Hayden, Washington, 1873, p. 431.

Conocoryphe (Ptychoparia), Bathyurus, Bathyurella (Asaphiscus) n. sg., *Asaphus, (Megalaspis), Agnostus.*

—— Report of the Geological Survey of Ohio. Vol. 1. Geology and palæontology. Pt. 2. Palæontology. Descriptions of invertebrate fossils of the Silurian and Devonian systems, by F. B. Meek.

Columbus, 1873, pp. 1-243, pls. 1-23.

Proetus, Dalmanites, Calymene, Asaphus (Isotelus), Acidaspis, Ceraurus, Illænus (Bumastus), Cythere, Leperditia.

—— Descriptions of *Olenus (Olenellus) gilberti* and *Olenus (Olenellus) howelli.*

In Rept. Geog. and Geol. Expl. Surveys West 100th Mer., vol. 3, Washington, 1875, p. 182.

—— A report on some of the invertebrate fossils of the Waverly group and Coal Measures of Ohio.

In Rept. Geol. Survey Ohio. Vol. 2. Geology and Palæontology. Pt. 2. 1875, pp. 269-347, pls. 10-20.

Phillipsia, Griffithides, Ceratiocaris (Colpocaris), Ceratiocaris (Solenocaris), Archæocaris, Colpocaris, Solenocaris.

—— Palæontology.

In U. S. Geol. Expl. 40th Parallel, vol. 4, pt. 1, 1877, pp. 1-197, pls. 1-17.

Paradoxides, Conocoryphe (Ptychoparia), Proetus, Dalmanites.

—— and **Hayden** (F. V.) Descriptions of new Lower Silurian, Jurassic, Cretaceous, and Tertiary fossils collected in Nebraska by the exploring expedition under the command of Capt. W. F. Raynolds, U. S. Top. Eng., with remarks on the rocks from which they were obtained.

In Proc. Acad. Nat. Sci. Phila., vol. 13, 1862, p. 415.

Arionellus, Arionellus (Crepicephalus) oweni.

—— —— Palæontology of the Upper Missouri. A report upon collections made principally by the expeditions under command of Lieut. G. K. Warren, U. S. Top. Eng., in 1855-'56. Invertebrates. Pt. 1.

In Smithsonian Contrib., No. 172, Washington, 1864, 5 pls.

Paradoxides, Agraulos, Agraulos oweni M. & H.

—— and **Worthen** (A. H.) Notice of some new types of organic remains from the Coal Measures of Illinois.

In Proc. Acad. Nat. Sci. Phila., vol. 17, 1865, p. 41.

Acanthotelson n. g.; *Belinurus, Anthrapalæmon, Palæocaris* n. g.

—— —— Contributions to the palæontology of Illinois and other Western States.

In Proc. Acad. Nat. Sci. Phila., vol. 17, 1865, p. 245.

Proetus, Phillipsia, Griffithides, Dalmania, Lichas.

—— —— Descriptions of invertebrates from the Carboniferous system.

In Geol. Survey Illinois, vol. 2, 1866, p. 145, pls. 14-20, 23-32.

Belinurus, Acanthotelson, Palæocaris, Anthrapalæmon.

—— —— Preliminary notice of a scorpion, a *Eurypterus*, and other fossils from the Coal Measures of Illinois.

In Am. Jour. Sci., 2d series, vol. 46, 1868, p. 19. Republished and illustrated in "Geol. Survey Illinois," vol. 3, p. 560.

—— —— Palæontology.

In Geol. Survey Illinois, vol. 3, 1868, pp. 291-565, pls. 1-20.

Proetus, Phacops, Dalmanites (Odonocephalus), Lichas, Acidaspis, Illænus, Ceratiocaris, Euproops, Palæocaris, Eurypterus (Anthrapalæmon), Acanthotelson.

—— —— Descriptions of a new species and genera of fossils from the Palæozoic rocks of the Western States.

In Proc. Acad. Nat. Sci. Phila., 2d series, vol. 14, 1870, p. 22.

Meek (F. B.) and **Worthen** (A. H.)—Continued.

Phillipsia tuberculata M. & W., *Phillipsia* (*Griffithides*) *bufo* M. & W., *Asaphus* (*Isotelus*) *vigilans* M. & W., *Illænus* (*Bumastus*) *graftonensis* M. & W., *Dithyrocaris carbonarius* M. & W.

—— —— Descriptions of invertebrates from the Carboniferous system.

In Geol. Survey Illinois, vol. 5, 1873, pp. 323–619, pls. 1–32.

Phillipsia (*Griffithides*) *portlocki*, *Phillipsia* (*Griffithides*) *bufo*, *Phillipsia* (*Griffithides*) *scitula*, *Dithyocaris carbonarius*.

—— —— Description of the invertebrates.

In Geol. Survey Illinois, vol. 6, 1875, pp. 489–532, pls. 23–33.

Lichas, *Asaphus* (*Isotelus*), *Sphærexochus*, *Illænus* (*Bumastus*).

Meneghini (Giuseppe). Nuovi fossili siluriani di Sardegna.

In Atti reale Accad. Lincei, Roma, 1880, 1 pl.

Dalmanites, *Lamarmoræ*.

—— Posizione relativa dei varii piani siluriani dell' Iglesiente in Sardegna.

In Proc. verb. Soc. Toscana Sci. Nat., 1881, p. 258.

Paradoxides, *Trinucleus*, *Dalmanites*, *Conocephalites*.

—— Fauna Cambriana dell' Iglesiente in Sardegna.

In Proc. verb. Soc. Toscana Sci. Nat., 1881, p. 158.

Paradoxides, *Olenus*, *Conocephalites*.

—— Nuovi Trilobiti di Sardegna.

In Proc. verb. Soc. Toscana Sci. Nat., 1881, p. 200.

Paradoxides, *Conocephalites*.

—— Note alla fauna Cambriana dell' Iglesiente.

In Proc. verb. Soc. Toscana Sci. Nat., 1882, p. 7.

Olenus, *Anomocare*, *Conocephalites*, *Platypeltis*.

—— Nuovi fossili Cambriani di Sardegna.

In Proc. verb. Soc. Toscana Sci. Nat., 1884, p. 56.

Conocephalites, *Anomocare*.

—— Palæontologia dell' Iglesiente in Sardegna. Fauna Cambriana trilobiti.

In Mem. R. Com. Geol. Italia, vol. 3, 1888, pt. 2, 49 pp., 7 pls.

Paradoxides, *Olenus*, *Anomocare*, *Conocephalites*, *Asaphus* (*Platypeltis*), *Conocoryphe*.

Meyer (H. von). Beiträge zur Petrefacten-Kunde.

In Nova Acta Acad. Leop. Carol., vol. 15, 1831, p. 57, pl. 56, fig. 13. See, also, Neues Jahrbuch für Mineral., 1833, p. 481.

Calymene æqualis Meyer.

Meyer (H. von) and **Münster** (G. G. zu). Beiträge zur Petrefacten-Kunde. Bayreuth, 1840, pt. 3, pl. 5.

Calymene variolaris, *C. intermedia*, *C. lævis*, *C. sternbergi*, *C. propinqua*, *C. articulata*, *Asaphus? caudori*, *A. pusillus*, *A.? brevis*, *A. grandis*, *Illænus perovalis?*, *Paradoxides brevimucronatus*, *Brontes radiatus*, *B. costatus*, *B. subradiatus*, *Bumastus frankonicus*, *B. planus*, *Harpes speciosus*, *Trinucleus gracilis*, *T. wilkensii*, *T. ellipticus*, *T. nelsoni*, *T.? otarion*, *T.? gibbosus*, *Agnostus pisiformis*.

—— —— Beiträge zu Petrefacten-Kunde. Bayreuth, 1842, pt. 5, p. 112. Nachtrag zu den Versteinerungen des Uebergangs-Kalkes mit Clymenien von Oberfranken vom Herausgeber.

Calymene marginata, pl. 10, fig. 6; *C. furcata*, *Asaphus dubius*, *Ellipsocephalus hoffi*, *Otarion elegans*, *Harpes*, *Trinucleus? lævis*, *T. intermedius*, *T. nilsoni*.

—— Squaliden-Reste aus dem Posidonomyen-Schiefer des Oberharzes bei Ober-Schulenburg.

In Dunker and von Meyer "Palæont.," vol. 3, Cassel, 1854, p. 53.

Harpes, *Proetus*, *Phacops*, *Lichas*, *Cheirurus*. *See, also*, Jordon (H.) and Meyer (H. von).

Mickleborough (John). Locomotory appendages of Trilobites.

In Jour. Cincinnati Soc. Nat. Hist., vol. 6, 1883, p. 200, figs. 1–3. Noticed: Am. Jour. Sci., 3d series, vol. 27, 1884, p. 409; Geol. Mag., n. s., decade 3, vol. 1, London, 1884, p. 80.

Asaphus megistos Locke.

Miller (S. A) Monograph of the Crustacea of the Cincinnati group.

In Cincinnati Quart. Jour. Sci., vol. 1, 1874, p. 115.

Triarthrus, *Proetus*, *Dalmanites*, *Calymene*, *Lichas*, *Trinucleus*, *Asaphus*, *Isotelus*, *Acidaspis*, *Ceraurus*, *Beyrichia*, *Leperditia*, *Cythere*.

.The author, in his classification and generic descriptions, has generally followed McCoy ("Brit. Palæozoic Rocks," 1855). He gives a description of the different fossil Crustacea occurring in the Cincinnati group, and figures *Leperditia byrnesi* Miller, and a wood-cut representing the tracks of an *Asaphus* (?).

—— [No title.—Description of new species of Palæozoic Entomostraca.]

In Cincinnati Quart. Jour. Sci., vol. 1, 1874, p. 232.

Beyrichia duryi, *B. striato-marginatus*, *B. chambersi*.

—— Some new species of fossils from the Cincinnati group, and remarks upon some described forms.

In Cincinnati Quart. Jour. Sci., vol. 2, 1875, p. 349, figures.

Acidaspis, *Beyrichia*, *Leperditia*.

Miller (S. A.)—Continued.

—— The American Palæozoic fossils. A catalogue of the genera and species, with names of authors, dates, places of publication, group of rocks in which found, and the etymology and signification of the words, etc. Cincinnati, 1877. Also a 2d ed., with supplement.

—— Description of a new genus and eleven new species of fossils, with remarks upon others well known, from the Cincinnati group.

In Jour. Cincinnati Soc. Nat. Hist., vol. 1, 1878–'79, p. 100, pl. 3.

Lichas harrisi, *Cythere irregularis*.

—— Description of two new species from the Niagara group, and five from the Keokuk group.

In Jour. Cincinnati Soc. Nat. Hist., vol. 2, 1879, p. 254, pl. 15.

Encrinurus egani.

—— Description of new species of fossils.

In Jour. Cincinnati Soc. Nat. Hist., vol. 4, 1881, p. 259, pl. 6.

Leperditia cæcigena.

—— Description of three new species, and remarks upon others.

In Jour. Cincinnati Soc. Nat. Hist., vol. 5, 1882, p. 116, pl. 5.

Calymene callicephala Green.

Milne-Edwards (H.) Sur les affinités des Trilobites.

In Institut de France, Acad. Royale Sci., vol. 1, 1827, p. 254.

—— Trilobites dans Lamarck's "Histoire naturelle des animaux sans vertèbres." Vol. 5. Paris, 1838, p. 220.

Paradoxides, *Ellipsocephalus*, *Conocephalus*, *Triarthrus*, *Calymene*, *Ampyx*, *Asaphus*, *Ogygia*, *Otarion*, *Agnostus*, *Ceraurus*, *Cypridina* n. g.

—— Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux. [3 vols., with atlas of plates.] Paris, 1834–'40.

The Trilobites are described in vol. 3, pp. 285–316, in the following order: *Nileus*, *Ampyx*, *Isotelus*, *Asaphus*, *Homalonotus*, *Calymene*, *Pleuracanthe* n. g. (referred by author to *Dalmanites*), *Trinucleus*, *Otarion*, *Ogygia*, *Paradoxides*, *Peltura* n. g. (the first species cited by the author under this new genus was: *Peltura scarabæoides* Wahlenburg; the second, *Peltura bucklandi* Milne-Edwards, is a species of the genus *Lichas*), *Agnostus*, *Eurypterus*. Classifies 64 species under 13 genera.

—— Report on the palæontological researches of M. Mario Ronault in Brittany and Anjou.

Milne-Edwards (H.)—Continued.

In Comptes Rendus Acad. Sci. Paris, 1847, vol. 24, p. 593; Bull. Soc. Géol. France, vol. 4, 1847, p. 309; Quart. Jour. Geol. Soc. London, vol. 4, 1848, pt. 2, Miscellaneous, p. 35.

Trinucleus, *Calymene*, *Phacops*, *Polyeres* n. g., *Prionocheilus*, *Cheirurus*, *Nileus*, *Ogygia*, *Illænus*.

—— Structure des Trilobites.

In Annales Sci. Nat., vol. 12, 1881, 33 pp., pls. 1–3.

A review of C. D. Walcott's "Organization of Trilobites."

Acidaspis, *Calymene*, *Ceraurus*, *Trinucleus*, *Asaphus*, *Eurypterus*.

Mitchell (John). On some new Trilobites from Bowning, N. S. W.

In Proc. Linnean Soc. New South Wales, 2d series, vol. 2, 1887, p. 435, pl. 16.

Proetus bowningensis, *Cyphaspis bowningensis*, *Bronteus longispinifer*.

—— On a new Trilobite from Bowning.

In Proc. Linnean Soc. New South Wales, 2d series, vol. 3, 1888, p. 397, pl. 16 of vol. 2.

Acidaspis longispinis.

Mitchell (Samuel L.) An account of the impressions of a fish in the rocks of Oneida County, New York.

In Am. Monthly Mag., vol. 3, 1818, p. 291.

The author states that the New York fossil, from the town of Westmoreland, "is separated into plates, like those of an insect or crustaceous animal, reaching from side to side quite across the back. Eleven entire plates and part of the twelfth can be counted. They are not so broad near the head and thorax as they are on approaching the tail; for between the pectoral fins they fall short of a quarter of an inch, while on approaching the caudal fin they gradually enlarge until they exceed that measure."

Eurypterus remipes De Kay.

Modeer (A.) Anmerkungen über einige nerikische Versteinerungen. (*)

In Berlin. Gesell. naturf. Freunde, vol. 6, 1785, p. 247, pl. 2, figs. 1–8–12.

(*Agnostus pisiformis*), pl. 2, figs. 1, 2; (*Olenus gibbosus*), pl. 2, figs. 3–5; (*Olenus scarabæoides*), pl. 2, fig. 7.

Möller (Valerian von). Ueber die Trilobiten der Steinkohlenformation des Ural, nebst einer Uebersicht und einigen Ergänzungen der bisherigen Beobachtungen über Kohlen-Trilobiten im Allgemeinen. Moscou, 1867. 1 pl.

In Bull. Soc. Imp. des Naturalistes Moscou, No. 1, 1867.

Griffithides, *Phillipsia*, *Brachymetopus*.

Morris (J.) Catalogue of British fossils. London, 1843. 2d ed., London, 1854.

Mortimer (C.) The description and figures of a small, flat, spheroidal stone having lines formed on it.

In Philos. Trans. Royal Soc. London, vol. 46, 1760, p. 602, pls. 1, 2.

(*Calymene blumenbachi.*)

Müller (O. F.) Entomostraca seu insecta testacea quæ in aquis Daniæ et Norwegiæ reperit, etc. Lipsiæ et Hafniæ, 1785. 21 pls.

Cythere n. g.

The generic term *Cytherina* was substituted by Lamarck for Müller's *Cythere*, and has been used by many authors. Prof. J. D. Dana uses the term *Cytherina* to represent a subgenus.

Münster (G. G.) Ueber einige fossile Arten *Cypris* und *Cythere*.

In Jahrbuch für Mineral., 1830, p. 60.

Cythere hisingeri.

—— and **Meyer** (H. von). See **Meyer** and **Münster**.

Murchison (R. I.) The Silurian system, founded on geological researches in the counties of Salop, Hereford, Radnor, etc. [London, 2 vols., 1839; 40 pls., and 3 large maps in folio.]

Calymene, *Homalonotus*, *Asaphus*, *Ogygia*, *Illænus*, *Bumastus* n. g., *Acidaspis* n. g., *Trinucleus* n. g., *Agnostus*.

—— Metamorphosis of certain Trilobites as recently discovered by M. Barrande.

In Rept. 19th Meeting Brit. Assoc. Adv. Sci., 1849, Trans. Sec., p. 58.

—— On the Silurian rocks of the south of Scotland, with a list and description of the Silurian fossils of Ayrshire, by J. W. Salter.

In Quart. Jour. Geol. Soc. London, vol. 7, 1851, p. 137, pls. 8–10.

Cheirurus gelasinosus Port., *Asaphus* sp.?, *Calymene blumenbachi* Brong., *Phacops stokesii* Milne-Edwards, *Illænus bowmani?*, *Lichas laxatus* McCoy, *Encrinurus punctatus* Brün.

—— Siluria. A history of the oldest rocks in the British Isles and other countries. [London, 1854, geol. map, 37 pls. 3d ed., London, 1859, geol. map, 41 pls. 4th ed., London, 1867, geol. map, 42 pls.]

The figures are all transferred from the original plates in the "Silurian system." In every case where the old name has been changed, in accordance with more recent nomenclature, the name used in the original work is inserted in brackets.

——, **Verneuil** (E. de) and **Keyserling** (Alex. von). Geology and palæontology of Russia and the Ural Mountains. [London, 1845, 2 vols., 50 pls. Palæontology, vol. 2; Crustacea, p. 376, pl. 27.]

Asaphus expansus Dalm., *Phillipsia eichwaldi* Fischer, *P. ouradica* n. s., *Calymene odeni* Eichw., *C. fischeri* Eichw.

Nathorst (A. G.) Om lager-följden inom Cambriska formationen vid Andrarum i Skåne.

In Öfversigt kongl. Svenska Vet.-Akad. Förhandl., 1869, No. 1, p. 61.

—— Om de Kambriska och Siluriska lagren vid Kiviksesperid i Skåne jemte anmärkningar om primordial faunans lager vid Andrarum.

In Geol. Föreningens Stockholm Förhandl., No. 37, vol. 3, 1876.

—— Om det inbördes förhållandet af lagren med *Paradoxides ölandicus* och *P. tessini* på Öland.

In Geol. Föreningens Stockholm Förhandl., No. 69, vol. 5, 1881.

—— Om det inbördes åldersförhållandet mellan zonerna med *Olenellus kjerulfi* och *Paradoxides ölandicus*.

In Geol. Föreningens Stockholm Förhandl., No. 71, vol. 6, 1882.

—— The position of the Olenellus beds.

In Am. Geol., vol. 2, 1888, p. 356.

Newberry (J. S.) China, by Ferdinand F. von Richthofen. Vol. 4. Berlin, 1883.

In Am. Jour. Sci., 3d series, vol. 26, 1883, p. 152.

This is a notice of the palæontological volume.

Nicholson (H. A.) A manual of palæontology for the use of students, with a general introduction on the principles of palæontology, in two volumes. Vol. 1. Edinburgh and London, 1879. Crustacea, Chapter XVIII.

Harpes, *Remopleurides*, *Paradoxides*, *Anopolenus*, *Dicellocephalus*, *Hydrocephalus*, *Olenus*, *Parabolina*, *Triarthrus*, *Bohemilla*, *Conocephalites*, *Angelina*, *Ellipsocephalus*, *Sao*, *Proetus*, *Arethusina*, *Phillipsia*, *Griffithides*, *Bathymetopus*, *Phacops*, *Dalmanites*, *Calymene*, *Homalonotus*, *Lichas*, *Trinucleus*, *Ampyx*, *Dionide*, *Æglina*, *Asaphus*, *Ogygia*, *Barrandia*, *Niobe*, *Nileus*, *Stygina*, *Illænus*, *Acidaspis*, *Cheirurus*, *Sphærexochus*, *Areia*, *Placoparia*, *Cromus*, *Encrinurus*, *Cybele*, *Dindymene*, *Bronteus*, *Agnostus*, *Microdiscus*, *Protichnites*, *Aristozoe*, *Beyrichia*, *Leperditia*, *Primitia*, *Entomis*, *Cythere*, *Eurypterus*, *Pterygotus*, *Isochilina*, *Cypris*, *Candona*, *Orozoe*, *Callizoe*, *Kirkbya*, *Moorea*, *Crypridina*, *Cytherella*, *Cytherellina*, *Æchmina*,

Nicholson (H. A.) - Continued.

Bairdia, Hymenocaris, Caryocaris, Peltocaris, Discinocaris, Aptychopis, Pterocaris, Cryptocaris, Ceratiocaris, Dithyrocaris, Aspidocaris, Estheria, Psilocephalus, Hemiaspis, Exapinurus, Pseudoniscus, Stylonurus, Neolimulus, Prestwichia, Belinurus.

—— and **Etheridge, jr.** (R.) A monograph of the Silurian fossils of the Girvan District, in Ayeshire, etc. Vol. 1, 1878–'80, 24 pls.

Fasciculus I. Rhizopoda, Actinozoa, and Trilobites (1878).

Phacops, Calymene, Lichas, Dindymene, Asaphus, Ogygia, Acidaspis, Cheirurus, Sphærexochus, Encrinurus, Cybele, Zethus, Atractopyge.

Fasciculus II. Trilobita, Phyllopoda, Cirripedia, and Ostracoda (1879).

Remopleurides (*Caphyra*), *Proetus, Cyphaspis, Phacops, Calymene, Lichas, Trinucleus, Ampyx, Salteria, Asaphus, Illænus, Cheirurus, Acidaspis, Encrinurus, Cybele, Bronteus, Agnostus, Bronteopsis, Lonchodomus, Raphiophones, Solenocaris, Pinnocaris, Peltocaris, Dictyocaris, Turrilepas, Beyrichia, Primitia, Cythere, Entomis.*

Fasciculus III. The Annelida and Echinodermata, with supplements on the Protozoa, Cœlenterata, and Crustacea (1880).

Trinucleus, Dionide, Cyclopyge, Staurocephalus, Agnostus, Turrilepas.

Nieszkowski (J.) Der *Eurypterus remipes* aus den ober-silurischen Schichten der Insel Oesel.

In Archiv Naturk. Liv-, Ehst- u. Kurl., vol. 2, 1858, p. 299, 2 pls.

—— Versuch einer Monographie der in den silurischen Schichten der Ostseeprovinzen vorkommenden Trilobiten.

In Archiv Naturk. Liv-, Ehst- u. Kurl., vol. 1, 1857, p. 517, 3 pls.

Proetus, Cyphaspis, Phacops, Calymene, Lichas, Asaphus, Illænus, Cheirurus, Sphærexochus, Amphion, Encrinurus, Zethus, Bronteus, Platymetopus.

—— Zusätze zur Monographie der Trilobiten der Ostseeprovinzen, nebst der Beschreibung einiger neuen ober-silurischen Crustaceen.

In Archiv Naturk. Liv-, Ehst- u. Kurl., vol. 1, 1859, p. 345, 2 pls.

Cyphaspis, Lichas, Asaphus, Cheirurus, Sphærexochus, Encrinurus, Bronteus, Bunodes, Exapinurus n. g., *Pseudoniscus* n. g.

Noväk (Ottomar). Studien an Hypostomen böhmischer Trilobiten. No. 1.

In Sitzungsberichte k. böhm. Gesell. Wiss., Jahrg. 1879, p. 475.

Noväk (Ottomar)—Continued.

Harpes, Paradoxides, Conocephalites, Proetus, Dalmanites, Trinucleus, Ampyx, Acidaspis, Cheirurus, Placoparia, Bronteus, Carmon, Harpina n. g., *Calymene, Illænus, Phacops.*

—— Studien an Hypostomen böhmischer Trilobiten. No. 2.

In Sitzungsberichte k. böhm. Gesell. Wiss., Jahrg. 1884, 1 pl.

Harpes, Harpina, Asaphus, Ogygia, Niobe.

—— Zur Kenntniss der böhmischen Trilobiten.

In Beiträge zur Palæontolographie von Oesterrich, Wien, 1884, 5 pls.

Harpes, Remopleurides, Phillipsia, Dalmanites, Calymene, Homalonotus, Æglina, Trinucleus, Ampyx, Dionide, Asaphus, Barrandia, Ptychocheilus, Illænus, Acidaspis, Cheirurus, Placoparia, Cromus, Bronteus, Agnostus.

—— Studien an Hypostomen böhmischer Trilobiten. No. 3.

In Sitzungsberichte k. böhm. Gesell. Wiss., Jahrg. 1885, p. 581, 1 pl.

Phillipsia, Phillipsinella n. g.

—— Remarques sur le genre *Aristozoe* Barrande.

In Sitzungsberichte k. böhm. Gesell. Wiss., Jahrg. 1885, p. 239, 1 pl.

Aristozoe, Callizoe, Ceratiocaris, Orozoe.

—— Nouveau Crustacé phyllocaride de l'étage F–f_2 en Bohême.

In Sitzungsberichte k. böhm. Gesell. Wiss., Jahrg. 1885, p. 343, 1 pl.

Ptychocaris n. g.

—— Studien an Hypostomen böhmischer Trilobiten. No. 4.

In Sitzungsberichte k. böhm. Gesell. Wiss., Jahrg. 1886, p. 429, plate.

Encrinurus, Cromus.

—— Zur Kenntniss der Fauna der Étage F–f_1 in der palæozoischen Schichtengruppe Böhmens.

In Sitzungsberichte k. böhm. Gesell. Wiss., Jahrg. 1886, p. 660, 2 pls.

Aristozoe.

—— Note sur Phasganocaris, nouveau Phyllocaride de l'étage F–f_2 en Bohême.

In Sitzungsberichte k. böhm. Gesell. Wiss., Jahrg. 1886, p. 498, 1 pl.

Phasganocaris n. g.

Oehlert (D.) Sur les fossiles dévoniens du département de la Mayenne.

In Bull. Soc. Géol. France, 3d series, vol. 5, 1877, p. 578, pl. 9.

Cryphæus michelini, C. jonesi, C. munieri, Homalonotus gervillei, Leperditia britannica, Primitia fischeri.

Oehlert (D.) Sur le Dévonien du département de la Sarthe.

In Bull. Soc. Géol. France, 3d series, vol. 7, 1879, p. 697, pl. 13.

Proetus guerangeri, *Bronteus verneuili.*

—— Description de *Goldius gerville* Barrande.

In Bull. Soc. d'Études Sci., Angers, 1885, 1 pl.

—— Études sur quelques Trilobites du groupe des Proetidæ.

In Bull. Soc. d'Études Sci., Angers, 1885, 2 pls. The author divides the Proetidæ into two divisions on the form of the glabella.

Sec. A. Glabella conic, genera *Proetus*, *Phæton*, *Dechenella*, and *Brachymetopus.*

Sec. B. Glabella pyriform, genera *Phillipsella*, *Phillipsia*, and *Griffithides.*

Harpes, *Conocephalites*, *Cyphaspis*, *Arethusina*, *Calymene*, *Asaphus*, *Ogygia*, *Bronteus.*

—— Études sur quelques fossiles dévoniens de l'ouest de la France.

In Bibliothèque de l'École des Hautes Études, Sec. Sci. Nat., vol. 33, 1887, 5 pls.

Proetus oehlerti Bayle, *Phacops portieri* Bayle.

Oldham (J.) On *Griffithides globiceps.*

In Jour. Geol. Soc. Dublin, vol. 3, pt. 3, 1846, p. 188, pl. 2.

Redrawn, pl. 6, fig. 1 a, b, Woodward's "Monograph British Carboniferous Trilobites," London, 1883.

Ordway (Albert). On the supposed identity of *Paradoxides harlani* Green with *P. spinosus* Boeck.

In Proc. Boston Soc. Nat. Hist., vol. 8, 1861, p. 1, 2 figs.

—— The organization of the Trilobites.

In Geol. Nat. Hist. Repertory, vol. 1, 1865, p. 12.

Owen (D. D.) Report of a geological exploration of part of Iowa, Wisconsin, and Illinois, made under instructions from the Secretary of the Treasury of the United States, in the autumn of the year 1839. Washington, 1840.

In 26th Cong., H. of Rep., Doc. 239, 2d ed., 1844; 28th Cong., Sen. Doc. 407, 18 pls. of fossils.

Pl. 12, fig. 3, *Calymene bufo*; pl. 16, fig. 1, *Illænus trentonensis?* (referred by Dr. D. D. Owen, in 1852, to *Illænus ovalis*); pl. 17, fig. 9, *Thaleops?*; pl. 18, fig. 2, *Asaphus*; pl. 18, fig. 10 (*Asaphus platycephalus*); pl. 18, fig. 2, *Asaphus.*

—— Report of a geological reconnoissance of the Chippewa Land District of Wisconsin and incidentally of a portion of the Kickapoo country, and a part of Iowa and of the Minnesota territory, etc. Washington, 1848.

Owen (D. D.)—Continued.

This report contains figures of the following fossils, which were afterwards described by Dr. D. D. Owen under the names of *Dikelocephalus minnesotensis*, pl. 7, figs. 2, 3; *Lonchocephalus hamulus*, pl. 7, fig. 5; *Dikelocephalus iowensis*, pl. 7, fig. 1.

—— Report of a geological survey of Wisconsin, Iowa, and Minnesota, and, incidentally, a portion of Nebraska Territory. Philadelphia, 1852, 638 pp., 27 pls., 16 sections and maps.

Dikelocephalus n. g., *Lonchocephalus* n. g., *Crepicephalus* n. g., *Menocephalus* n. g., *Asaphus* (*Isotelus*) *iowensis.*

Owen (Richard). Description of the impressions and foot-prints of the *Protichnites* from the Potsdam sandstone of Canada.

In Quart. Jour. Geol. Soc. London, vol. 8, 1852, p. 214, pls. 9–14a.

—— Palæontology, or a systematic summary of extinct animals and their geological relation. Edinburgh, 1861.

Class 3. Crustacea, pp. 45–51.

Pacht (R.) Geognostische Untersuchungen zwischen Orel Woronasch und Simbirsk im Jahre 1853.

In Beiträge zur Kenntniss des russischen Reiches und der angränzenden Länder Asiens, St. Petersburg, 1858.

Packard, jr. (A. S.) On the embryology of *Limulus polyphemus.*

In Proc. Am. Assoc. Adv. Sci., 1870, 19th meeting, p. 247.

Notes on the larva of Trilobites, etc.

—— The structure of the eye of Trilobites.

In Am. Naturalist, vol. 14, 1880, p. 503.

—— A monograph of the Phyllopod Crustacea of North America, with remarks on the order Phyllocarida. Pls. 1–38.

In Twelfth Rept. U. S. Geol. Survey Territories (Hayden), Washington, 1883, pt. 1, p. 295.

Hymenocaris, *Peltocaris*, *Ceratiocaris*, *Echinocaris*, *Discinocaris*, *Spathiocaris*, *Lisgocaris*, *Aptychopsis*, *Dictyocaris*, *Dithyrocaris*, *Rachura*, *Argus*, *Estheria*, *Leaia.*

—— Types of Carboniferous *Xiphosura* new to North America.

In Am. Naturalist, vol. 19, 1885, p. 291.

Belinurus, *Euproops*, *Cyclus*, *Dipeltis* n. g.

—— The *Syncarida*, a group of Carboniferous Crustacea.

In Am. Naturalist, vol. 19, 1885, p. 700.

Acanthotelson.

Packard, jr. (A. S.)—Continued.

—— On the *Gampsonychidæ*, an undescribed family of fossil *Schizopod* Crustacea.

In Am. Naturalist, vol. 19, 1885, p. 790; Mem. Nat. Acad. Sci., vol. 3, 1886, p. 129, pl. 3.
Palæocaris, *Gampsonyx*.

—— On the *Anthracoridæ*, a family of Carboniferous *Macrurous* decapod Crustacea allied to the *Eryonidæ*.

In Am. Naturalist, vol. 19, 1885, p. 880; Mem. Nat. Acad. Sci, vol. 3, 1886, p. 135, pl. 4.
Anthrapalæmon.

—— Discovery of the thoracic feet in a Carboniferous *Phyllocaridan*.

In Am. Philos. Soc., vol. 23, 1886, p. 380, plate.
Cryptozoe problematicus.

—— On the class *Podostomata*, a group embracing the Merostomata and Trilobites.

In Am. Naturalist, vol. 20, 1886, p. 1060.
Merostomata: *Xiphosura*, *Synziphosura*, *Eurypteridæ*.

—— On the Syncarida, a hitherto undescribed synthetic group of extinct Malacostracous Crustacea.

In Mem. Nat. Acad. Sci., vol. 3, pt. 2, 1886, p. 123, pls. 1, 2.
Acanthotelson.

—— On the Carboniferous Xiphosurous fauna of North America.

In Mem. Nat. Acad. Sci., vol. 3, pt 2, 1886, p. 143, 8 figs., 3 pls.

Cyclus, *Dipeltis*, *Prestwichia*, *Belinurus*, *Palæocaris*, *Anthrapalæmon*, *Protolimulus* n. g., *Bunodes*, *Pseudoniscus*, *Exapinurus*, *Hemiaspis*, *Neolimulus*.

Page (David). On the *Pterygotus* and *Pterygotus* beds of Great Britain.

In Rept. 25th Meeting Brit. Assoc. Adv. Sci., 1855, Trans. Sec., p. 89.

The genus *Stylonurus* was proposed by Mr. David Page in his paper read before the Association, and the name published in his "Advance text-book of geology," 1856.

—— Further contributions to the palæontology of the Tilestones or Silurio-Devonian strata of Scotland.

In Rept. 28th Meeting Brit. Assoc. Adv. Sci., Trans. Sec., p. 104.

Beyrichia, *Ceratiocaris*, *Himantopterus*, *Stylonurus spinipes*, *S. clavipes*, *Kampecaris*, *Eurypterus*.

—— Advance text-book of geology. London, 1856.

Slimonia n. g, *Stylonurus* n. g., *Kampecaris*, *Himantopterus*, *Pterygotus*, *Parka*.

Page (David)—Continued.

In the second edition, 1859, Mr. David Page gives restorations of *Pterygotus anglicus*, *Himantopterus acuminatus*, *Stylonurus powriei*, *S. spinipes*, *Eurypterus clavipes*, *E. scouleri*, and *Limulus rotundatus*.

—— Note on the genus *Stylonurus* from the Old Red Sandstone of Forfarshire.

In Proc. Royal Phys. Soc. Edinburgh, session 1864-'65, p. 230.

Pander (C. H.) Beiträge zur Geognosie des russischen Reiches. St. Petersburgh, 1830; Leipzig, 1839, 31 pls.

Calymene, *Asaphus*, *Illænus*, *Nileus*, *Amphion* n. g., *Zethus* n. g.

Parkinson (James). Organic remains of a former world, an examination of the mineralized remains of the vegetable and animal antediluvian world generally termed extraneous fossils. London, 1808, 3 vols. Crustacea, vol. 3, letter 16*, pl. 17.

Calymene, *Ogygia*, *Encrinurus*, *Phacops*, *Belinurus*.

Payton. (—). Trilobites found in the Transition limestone at Dudley, from the collection of Mr. Payton, at Dudley. London, 1827, 2 pp., 2 pls.

Calymene blumenbachii and *Asaphus caudatus*.

Peach (B. N.) On some new Crustaceans from the Lower Carboniferous rocks of Eskdale and Liddesdale.

In Trans. Royal Soc. Edinburgh, vol. 30, pt. 1, 1880, p. 73, 4 pls.
Ceratiocaris, *Anthrapalæmon*, *Palæocrangon*, *Palæocaris*, *Uronetes*.

—— Further researches among the Crustacea and Arachnida of the Carboniferous rocks of the Scottish border.

In Trans. Royal Soc. Edinburgh, vol. 30, pt. 2, 1880, p. 511, 2 pls.
Prestwichia, *Cyclus*, *Eurypterus*, *Glyptoscorpius* n. g., *Acanthocaris* n. g., *Anthrapalæmon*, *Palæocrangon*, *Palæocaris*, *Pseudo-Galathea* n. g.

—— On the occurrence of *Pterygotus* and a *Limuloid* in the Caithness Flagstones, and on the nature and mode of formation of "Adam's plate."

In Proc. Royal Phys. Soc. Edinburgh, 1883, p. 343, plate.
Pterygotus dicki.

Phillips (John). On the occurrence of some minute fossil Crustaceans in Palæozoic rocks.

In Rept. 11th Meeting Brit. Assoc. Adv. Sci., 1841, Trans. Sec., p. 64.

Phillips (John)—Continued.

—— Illustrations of the geology of Yorkshire. Pt. 2. The mountain limestone district. London, 1836, p. 239.

Asaphus (*Phillipsia*).

—— Figures and descriptions of the Palæozoic fossils of Cornwall, Devon, and West Somerset, observed in the course of the Ordnance Geological Survey of that district. London, 1841, 60 pls. Crustacea, p. 127.

Harpes, *Calymene* (*Ceraurus*, *Phacops*), *Homalonotus*, *Asaphus*, *Bronteus*.

—— The Malvern Hill compared with the Palæozoic district of Abberley, Woolhope, May Hill, Tortworth, and Usk.

In Mem. Geol. Survey Gt. Brit., vol. 2, pt. 1, London, 1848. Palæontological appendix to Prof. John Phillips's memoir on the "Malvern Hills compared with the Palæozoic district of Abberley," etc., by John Phillips and J. W. Salter. *Ibid.*, pp. 331–386, 30 pls.

For list of genera, see Salter (J. W.) and Phillips (John).

—— Manual of geology. Pt. 2. Ed. by Rob. Etheridge. 1885, pls. 1–12.

Paradoxides, *Olenus*, *Asaphus*, *Ogygia*, *Calymene*, *Trinucleus*, *Agnostus*, *Illænus*, *Lichas*, *Beyrichia*, *Stygina*, *Phacops*, *Cybele*, *Cheirurus*, *Remopleurides*, *Harpes*, *Ampyx*, *Acidaspis*, *Cyphoniscus*, *Æglina*, *Sphærexochus*, *Encrinurus*, *Cyphaspis*, *Proetus*, *Pterygotus*, *Bronteus*, *Homalonotus*, *Phillipsia*.

Pictet (F.-J.) Traité de paléontologie, ou histoire naturelle des animaux fossiles considérés dans leurs rapports zoologique et géologique. 4 vols and atlas. Paris, 1853–'57. Crustacea, vol. 2, 1854, p. 413.

The author arranges the families and genera as follows: Harpidæ: *Harpes*. Paradoxidæ: *Remopleurides*, *Paradoxides*, *Hydrocephalus*, *Sao*, *Arionellus*, *Ellipsocephalus*, *Olenus*, *Peltura*, *Triarthrus*, *Conocephalites*. Calymenidæ, 1st section, Proetidæ: *Proetus*, *Phillipsia*, *Cyphaspis*, *Arethusina*, *Harpes*; 2d section, Phacopidæ: *Phacops*, *Dalmania*; 3d section, Calymenidæ: *Calymene*, *Homalonotus*. Lichasidæ. *Lichas*. Trinucleidæ: *Trinucleus*, *Ampyx*, *Dionide*. Asaphidæ: *Asaphus*, *Symphysurus*, *Ogygia*. Æglinidæ: *Æglina*. Illænidæ: *Illænus*, *Nileus*. Odontopleuridæ: *Acidaspis*, *Cheirurus*, *Placoparia*, *Sphærexochus*, *Staurocephalus*, *Deiphon*, *Zethus*, *Dindymene*. Amphionidæ: *Amphion*, *Cromus*, *Encrinurus*. Brontidæ: *Bronteus*. Agnostidæ: *Agnostus*. Phyllopodæ: *Apusiens*, *Dithyrocaris*, *Apus*, *Estheria*, Copepodæ: *Eurypterus*. Cyproidæ: *Cythere*, *Bairdia*, *Beyrichia*, *Leperditia*, *Cypris*. Cypridinæ: *Cyprella*, *Cypridella*. Xiphosuræ: *Limulus*, *Belinurus*, *Pterygotus*. Amphipodæ: *Gampsonyx*.

Pitt. See **Grote** and **Pitt.**

Plant (John). On the discovery of *Paradoxides davidis* at Tyddyngwladis, near Dolgelly, North Wales.

In Trans. Manchester Geol. Soc., vol. 5, 1886, p. 76.

Pohlman (Julius). On certain fossils of the Waterlime group near Buffalo.

In Bull. Buffalo Soc. Nat. Sci., vol. 4, 1881, p. 17, 7 figs.

Pterygotus buffaloensis, *Ceratiocaris grandis*.

—— Additional notes on the fauna of the Waterlime group.

In Bull. Buffalo Soc. Nat. Sci., vol. 4, 1882, p. 41, 2 pls.

Eurypterus giganteus, *Pterygotus globicaudatus*, *P. acuticaudatus*, *P. quadraticaudatus*, *P. macrophthalmus?*, *P. buffaloensis*.

—— Fossils from the Waterlime group near Buffalo, N. Y.

In Bull. Buffalo Soc. Nat. Sci., vol. 5, 1886, p. 17, pl. 3.

Pterygotus buffaloensis, *P. bilobus*, *Ceratiocaris acuminatus*, *Eusarcus*, *E. grandis*, *Eurypterus scorpionis* (the term *Eurypterus scorpiœdes* was used by Henry Woodward for a species of this genus in 1868. See *Eurypterus pohlmani*).

Portlock (J. E.) Report on the geology of the county of Londonderry, and of parts of Tyrone and Fermanagh. Dublin, 1843, 28 pls., also maps and sections.

Harpes, *Remopleurides* n. g., *Proetus*, *Phillipsia* n. g., *Griffithides* n. g., *Phacops*, *Calymene*, *ges*, *Trinucleus*, *Ampyx*, *Nuttainia*, *Asaphus*, *Isotelus*, *Ogygia*, *Ceraurus*, *Amphion*, *Zethus*, *Brontes*, *Illænus*, *Dithyocaris* (Scouler) Portlock, *Limulus*.

Postlethwaite (J.) and **Goodchild** (J. G.) On some Trilobites from the Skiddaw slates.

In Proc. Geologist Assoc., vol. 9, No. 7, 1886, p. 455, pls. 6–9.

In this contribution the initials of each author designate the paragraphs written by him.

The following list is given of the Trilobite fauna of the Skiddaw slates:

Phacops nicholsoni Salter, *Cybele ovata* Etheridge, *Calymene brevicapitata?*, *Remopleurides* sp.?, *Olenus* sp.?, *Trinucleus gibbsii?*, *Ogygia selwyni*, *Ogygia* sp.?, *Barrandia falcata* P. & G., *Niobe doveri* Eth., *Eurymetopus cambrianus* n. g. and n. sp. P. & G., *E. harrisonii* P. & G., *Æglina? rediviva* Barr., *A. binodosa*, *A. obtusicauda* Hicks, *A.? caliginosa*, *Agnostus morei* Salter.

Prestwich (S.) On the geology of Coalbrook Dale.

In Trans. Geol. Soc. London, vol. 5, 1840, p. 413, map, 2 sections, 4 pls.

Belinurus.

Quenstedt (F. A.) Beiträge zur Kenntniss der Trilobiten. Rücksicht auf ihre bestimmte Gliederzahl.

In Archiv für Naturgesch. (Wiegmann), vol. 1, Berlin, 1837, p. 337.

In this work Prof. F. A. Quenstedt divides the Trilobites into two groups: 1. Trilobites with faceted eyes; 2. Trilobites with non-faceted eyes. The genera are classified according to the number of segments in the thorax.

Rafinesque (C. S.) On the genera of fossil Trilobites or Glomerites of North America.

In Atlantic Jour. and Friend to Knowledge, vol. 1, 1832, p. 71.

Ramsay (A. C.) The geology of North Wales, with an appendix on the fossils; with plates by J. W. Salter.

In Mem. Geol. Survey Gt. Brit., vol. 3, 1866.

*Dikelocephalus, Olenus, Parabolina, Conocoryphe, Angelina, Homalonotus, Lichas, Trinucleus, Dionide, Ampyx, Asaphus, *Niobe, Æglina, Cheirurus, Encrinurus, Illænus, Agnostus, Psilocephalus, Beyrichia, Hymenocaris.*

Rathbun (Richard). See **Hartt** (C. F.) and **Rathbun** (Richard).

Ratte (F.) Note on some Trilobites new to Australia.

In Proc. Linn. Soc. New South Wales, 2d series, vol. 1, 1886, p. 1067, 3 pls.

Lichas, Proetus, Acidaspis.

—— Note on some Trilobites new to Australia.

In Proc. Linn. Soc. New South Wales, 2d series, vol. 2, 1887, p. 95, 2 pls.

Lichas, Acidaspis, Staurocephalus.

Razoumowsky (*Comte* de). Quelques observations sur les Trilobites et leurs gisements.

In Annales Sci. Nat. Paris, vol. 8, 1826, p. 186. Trilobites de Zarsko silo.

Remete (A.) Kataloge der Geschiebesammlung. Berlin, 1885. (*)

Reuss (A. E.) Entomostraca and Foraminifera of the Zechstein of the Wetterau. Plate.

In Jahresbericht der wetterauischen Gesell. für die gesammte Naturk., 1854, p. 59 (Hanau).

—— Palæontologische Miscellen.

In Denkschriften k. Akad. Wiss. Wien, vol. 10, 1856, 7 pls.

Lepidoderma n. g., *Lepidoderma imhoffi.*

This genus is referred by H. Woodward to the genus *Eurypterus.*

Reuss (F.) Geognostische Bemerkungen auf einer Reise durch einen Theil des Pilsner Kreises.

In Sammlung naturhist. Aufsätze, vol. 4, 1794, p. 47.

Reuter (G.) Die *Beyrichien* der obersilurischen Diluvialgeschiebe Ostpreussens.

In Zeitschr. Deutsch geol. Gesell., Berlin, vol. 37, 1885, p. 621, pls. 25, 26.

Richter (R.) Beiträge zur Palæontologie Thüringens. Leipzig, 1848, 6 pls.

—— Aus dem thüringischen Zechstein.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 7, 1855, p. 526.

Cythere, Cytherella, Cythereis, Bairdia.

—— Aus dem thüringischen Schiefergebirge.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 15, 1863, p. 659, 2 pls.

Harpes, Proetus, Arethusina, Phyllaspis n. g., *Phacops, Acidaspis, Beyrichia.*

—— Aus dem thüringischen Schiefergebirge.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 17, 1865, p. 361, 2 pls.

Proetus expansus, P. plagiophthalmus, Cheirurus, Beyrichia klödeni, B. subcylindria.

—— Das thüringische Schiefergebirge.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 21, 1869, p. 341.

Proetus, Phacops, Dalmanites.

—— Devonische Entomostraceen in Thüringen.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 21, 1869, p. 757, pls. 20, 21.

Beyrichia, Cypridina, Cytherina.

Roberg (L.) Dissertatio academica de fluviatile Astaco, etc. Upsaliæ, 1715.

This work contains a plate with the figure of the pygidia of Trilobites and a fossil Crustacean. Fig. H is of a large pygidium of some species of *Asaphus*. Fig. J is a cast in stone of a smaller species of the same genus. The author remarks "that he found the specimens during an excursion along the shores of the Baltic Sea, in a red limestone." He has the merit of referring these fossils to the class Crustacea.

Roemer (F. A.) Versteinerungen der Hartzgebirge. Hannover, 1843, 12 pls. Crustacea, p. 37.

Brontes flabellifer, B. signatus, B.? glabratus, Calymene? jordoni, C. schusteri, C. subornatus, C. hydrocephala, Asaphus zinckeni, Paradoxides grotei, Homalonotus ahrendi, H. punctatus, H. gigas.

Roemer (Ferdinand). Beiträge zur geologischen Kenntniss des nordwestlichen Harzgebirges.

In Palæontographica, vols. 3, 5, and 13, 5 pts., Cassel, 1854–'66, 38 pls.

Conocephalus, Proetus, Cyphaspis, Phacops, Trimerocephalus, Homalonotus, Lichas, Bronteus, Acidaspis, Trochus, Cheirurus, Dithyrocaris, Cypridina, Harpes, Phillipsia.

Roemer (Ferdinand)—Continued.

—— Das rheinische Uebergangsgebirge, eine palæontologisch - geognostische Darstellung. Hannover, 1844, pl. 2.

Phacops latifrons, *Pleuracanthus acimatus*, *P. punctatus*, *Gerastos lævigatus*.

—— Texas, mit besonderer Rücksicht auf deutsche Auswanderung und die physischen Verhältnisse des Landes, nach eigener Beobachtung geschildert. Mit einem naturwissenschaftlichen Anhange und einer topographisch-geognostischen Karte von Texas. Bonn, 1849.

In the list of fossils on p. 421 *Pterocephalia sancti sabæ* Roemer is mentioned.

—— Ueber ein bisher nicht beschriebenes Exemplar von *Eurypterus* aus devonischen Schichten des New York.

In Palæontographica, vol. 1, 1851, p. 190.

—— Die Kreidebildung von Texas. Bonn, 1852, 11 pls.

Pterocephalia sancti sabæ n. g. and sp.

—— Notiz über eine riesenhafte neue Art der Gattung *Leperditia* in silurischen Diluvial-Geschieben Ost-Preussen's.

In Zeitschr. Deutsch. geol. Gesell, Berlin, vol. 10, 1858, p. 356, 2 figs.

Leperditia baltica, *L. gigantea*.

—— Die Versteinerungen der silurischen Diluvial-Geschiebe von Gröningen in Holland.

In Neues Jahrbuch für Mineral., 1858, p. 257.

Proetus, *Encrinurus*, *Beyrichia*, *Cytherina*.

—— Die Silurische Fauna des westlichen Tennessee. Breslau, 1860, 5 pls.

Dalmania, *Calymene*, *Ceraurus*, *Sphærexochus*, *Bumastus*.

—— Palæo-lethæa. II. Theil: Kohlen-Periode (Silur-, Devon-, Kohlen- und Zechstein-Formation).

In Bronn's Lethæa geognostica, etc., Stuttgart, 1851-'56.

For list of genera, see Bronn (H. G.) and Roemer (F.) Lethæa geogn.

—— Bericht über eine geologische Reise nach Norwegen im Sommer 1859.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 11, 1860.

Dalmania, *Cryphæus*, *Asaphus*, *Illænus*, *Phacops*.

—— Die fossile Fauna der silurischen Diluvial-Geschiebe von Sadewitz bei Oels in Niederschlesien. Breslau, 1861, 8 pls.

Ceraurus, *Remopleurides*, *Isotelus*, *Asaphus*, *Illænus*, *Chasmops*, *Proetus*, *Calymene*, *Encrinurus*, *Lichas*.

Roemer (Ferdinand)—Continued.

—— Ueber die Diluvial-Geschiebe von nordischen Sedimentär-Gesteinen in den norddeutschen Ebene etc.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 14, 1862, p. 575.

Beyrichia.

—— Ueber eine marine Conchylien-Fauna im productiven Steinkohlengebirge Oberschlesiens.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 15, 1863, p. 567, pls. 14-16.

Griffithides mesotuberculata McCoy, *Phillipsia*.

—— Notiz über das Vorkommen von *Eurypterus scouleri* im niederschlesischen Steinkohlengebirge.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 25, 1873, p. 562, 1 fig.

—— Lethæa palæozoica. Stuttgart, 1880. Text and atlas.

—— Ueber die Gattung *Arthropleura* aus dem schlesischen Steinkohlengebirge.

In Sitzungsber. schles. Gesell. für vaterländ. Cultur, Breslau, Jahrg. 1880, p. 128.

—— Ueber eine Kohlenkalk-Fauna der Westküste von Sumatra. Cassel, 1880, 3 pls.

Phillipsia sumatrensis Roemer.

—— Ueber eine Art der Limuliden-Gattung *Belinurus* aus dem Steinkohlengebirge Oberschlesien's.

In Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 35, 1883, p. 429, 2 figs.

—— Lethæa erratica, oder Aufzählung und Beschreibung der in den norddeutschen Ebene vorkommenden Diluvial Geschiebe nordischen Sedimentär-Gesteine. Berlin, 1885, 11 pls.

In this work many Trilobites and other Crustacea are mentioned, but only a few new species are figured.

Rogers (W. B.) Discovery of *Paradoxides* in the altered rocks of Massachusetts.

In Edinb. New Philos. Jour., vol. 4, 1856.

—— On the discovery of Cambrian fossils at Braintree, Mass.

In Proc. Boston Soc. Nat. Hist., vol. 5, 1854, p. 27 (continued on p. 40).

Paradoxides harlani Green.

—— *Paradoxides* near Boston.

In Edinb. New Philos. Jour., vol. 6, 1857, p. 314.

Rogers (Henry D.) The geology of Pennsylvania. A Government survey with a general view of the geology

Rogers (Henry D.)—Continued.
of the United States, essays on the coal formation and its fossils, and a description of the coal fields of North America and Great Britain. 2 vols. Edinburgh, London, and Philadelphia, 1858. Atlas of plates and maps.

Organic remains of the Palæozoic strata of Pennsylvania, vol. 2, pp. 815–834.

Paradoxides, *Asaphus*, *Calymene*.

Notes on the *Beyrichia* and *Leperditia*, by T. Rupert Jones, vol. 2, p. 834, figs. 595–699.

Rominger (C.) Description of Primordial fossils from Mount Stephens, N. W. Territory of Canada.

In Proc. Acad. Nat. Sci. Phila., 1887, p. 12, 1 pl.

Ogygia, *Embolimus* n. g., *Menocephalus*, *Conocephalites*, *Bathyurus?*, *Agnostus*.

—— Dr. C. Rominger's rejoinder to Mr. C. D. Walcott.

In Am. Geologist, vol. 2, 1888, p. 356.

Rouault (Marie). Mémoire sur les Trilobites du département d'Ille et-Vilaine.

In Bull. Soc. Géol. France, 2d series, vol. 4, 1846, p. 309.

Trinucleus, *Nileus*, *Prionocheilus* n. g., *Calymene*, *Phacops*, *Polyeres*, *Cheirurus*, *Trinucleus*.

—— Mémoire. 1. Sur la composition du test des Trilobites. 2. Sur les changements de formes dus à des causes accidentelles, ce qui a pu permettre de confondre des espèces différentes.

In Bull. Soc. Géol. France, vol. 6, 1848, p. 67, pls. 1-2.

Ogygia brongniarti, *O. edwardsi*, *Illænus desmaresti*, *Calymene arago*, *Trinucleus*.

—— Fossiles du terrain silurien, étage du schiste, ardoisier fosillifère, Crustacés, famille des Trilobites.

In Bull. Soc. Géol. France, vol. 8, 1851, p. 358.

Calymene salteri, *C. verneuili*, *Dalmannia vetillarti*, *D. incerta*, *Placoparia tournemini*, *Ogygia desmaresti*, *Homalonotus brongniarti*, *H. barrandei*, *H. hausmanni*, *H. legraverendi*, *Plæsiacomia kieneria*, *Proetus huhayi*, *P. michelini*, *Cyphaspis*, *Beyrichia*, *Leperditia* n. g., *L. britannica*, *Phacops*.

Safford (J. M.) Geology of Tennessee. Nashville, 1869, 7 pls. and map.

The author, in his catalogue of Trenton and Nashville fossils occurring in the Central Basin, p. 285, gives the names of *Dalmanites troosti* n. s. and *Encrinurus excedrinus* n. s., but without specific descriptions.

Sandberger (G.) and **Sandberger** (F.) Die Versteinerungen des rheinischen Schichten-System in Nassau. Wiesbaden, 1850–'56, atlas in folio, 39 pls.

Sandberger (G.) and **Sandberger** (F.)—Continued.

Harpes, *Cyphaspis*, *Trigonaspis* n. g., *Cylindraspis* n. g., *Phacops*, *Dalmanites*, *Homalonotus*, *Odontopleura*, *Cheirurus*, *Bronteus*, *Cyprindia*.

Salter (J. W.) On the structure of *Trinucleus*, with remarks on other species.

In Quart. Jour. Geol. Soc. London, vol. 3, 1847, p. 251, 4 figs.

—— Crustacea.

In Mem. Geol. Survey Gt. Britain, vol. 2, pt. 1, 1848, pp. 333–352, figure, pls. 5–8.

Olenus, *Proetus*, *Phacops*, *Dalmannia*, *Calymene*, *Lichas*, *Trinucleus*, *Ampyx*, *Ogygia*, *Illænus*, *Acidaspis*, *Cheirurus*, *Sphærexochus*, *Cybele*, *Agnostus*, *Beyrichia*.

—— and **Forbes** (Edward). Figures and descriptions illustrative of British organic remains. Decade 2.

In Mem. Geol. Survey United Kingdom London, 1849, 10 pls.

Paradoxides, *Olenus*, *Parabolina* n. g., *Phacops*, *Dalmannia*, *Portlockia*, *Cryphæus*, *Calymene*, *Ampyx*, *Brachampyx* n. g., *Asaphus*, *Ogygia*, *Illænus*, *Bumastus*.

The description of all the species, with the exception of *Ampyx nudus*, was made by J. W. Salter.

—— Description of *Pterygotus problematicus* Agass.

In Quart. Jour. Geol. Soc. London, vol. 8, 1852, p. 386, pl. 21.

Pterygotus, *Bellinurus*.

—— Appendix A to British Palæozoic fossils in the Geological Museum, University of Cambridge. London, 1852 (Sedgwick and McCoy).

Description of a few species from Wales and Westmoreland, referred to in the foregoing work by John William Salter, p. 645.

Phacops, *Calymene*, *Homalonotus*, *Lichas*, *Illænus*, *Cheirurus*, *Encrinurus*, *Cybele*, *Beyrichia*, *Cythere*, *Eurypterus*.

—— On the lowest fossiliferous beds of North Wales.

In Rept. 22d Meeting Brit. Assoc. Adv. Sci., 1852, Trans. of Sec., p. 56.

Hymenocaris n. g.

—— On a few genera of Irish Silurian fossils.

In Rept. 22d Meeting Brit. Assoc. Adv. Sci., 1852, Trans. of Sec., p. 59.

Stygina n. g., *Cyphoniscus* n. g., *Remopleurides*, *Cyphaspis*, *Æglina*, *Acidaspis*.

—— Notes on the Trilobites.

Appendix C to an article by Senhor Carlos Ribeiro on the Carboniferous and Silurian formations of the neighborhood of Bussaco, in Portugal.

Salter (J. W.)—Continued.

In Quart. Jour. Geol. Soc. London, vol. 9, 1853, p. 158, pl. 7.

Phacops, *Calymene*, *Trinucleus*, *Ogygia*, *Illænus*, *Placoparia*.

—— On Arctic Silurian fossils.

In Quart. Jour. Geol. Soc. London, vol. 9, 853, p. 312.

Proetus, *Encrinurus*, *Leperditia*.

—— Figures and descriptions illustrative of British organic remains. Decade 7.

In Mem. Geol. Survey United Kingdom, London, 1853, 10 pls.

The genera are arranged in this work in the following order: 1. *Phacops downingiæ*, section Acaste, *P. apiculatus*, *P. brongniarti*, *P. dalmanni*, *P. jamesii*, *P. alifrons*, *P. jukesii*, *P. conophthalmus*; section Odontochile (*Dalmannia*), *P. mucronatus*, *P. amphora*. 2. *Cheirurus bimucronatus*, section Crotalocephalus, *C. articulatus?*; section Cheirurus, *C. speciosus*, *C. gelasinosus*, *C. cancrurus*, *C. octolobatus*; section Actinopeltis, *C. clavifrons*. 3. *Sphærexochus mirus*. 4. *Encrinurus sexcostatus*, *E. punctatus*, *E. variolaris*, *E. multisegmentatus*. 5. *Cyphaspis megalops*, *C. pygmæus* 6. *Acidaspis jamesii*, *A. bispinosus*, *A. caractaci*. 7. *Trinucleus lloydii*, section 1, Trinucleus proper, *T. concentricus*, with four varieties, *T. thersites*; section 2, Tretaspis, *T. seticornis*, *T. fimbriatus*, *T. radiatus*. 8. *Remopleurides colbii*, *R. laterispinifer*, *R. dorsopinifer*; section Remopleurides, *R. platyceps*, *R. longicostatus*, *R. obtusus*; section 2, Caphyra, *R.* (*Caph.*) *radians*. 9. *Cyphoniscus socialis*. 10. *Æglina mirabilis*, *Æglina major*.

—— On some new Crustacea from the uppermost Silurian rocks, by J. W. Salter. With a note on the structure and affinities of Himantopterus, by T. H. Huxley.

In Quart. Jour. Geol. Soc. London, vol. 12, 1856, pl. 26, figs. 1-7.

Himantopterus n. g.

—— Description of the Crustaceans from the uppermost Silurian rocks near Lesmahago.

In London, Edinb., Dublin Philos. Mag., vol. 11, 1856, p. 83.

Himantopterus.

—— On the great *Pterygotus* (Seraphim) of Scotland and other species.

In Rept. 26th Meeting Brit. Assoc. Adv. Sci., 1856, Trans. of Sec., p. 75.

—— On fossil remains in the Cambrian rocks of the Longmynd and North Wales.

In Quart. Jour. Geol. Soc. London, vol. 12, 1856, p. 246.

Palæopyge ramsayi, pl. 4, fig. 3, new species and genus.

Salter (J. W.)—Continued.

—— On two Silurian species of *Acidaspis* from Shropshire.

In Quart. Jour. Geol. Soc. London, vol. 13, 1857, p. 210, pl. 6.

—— On some new species of *Eurypterus*. With note on the distribution of the species.

In Quart. Jour. Geol. Soc. London, vol. 15, 1859, p. 229, pl. 10.

—— On the fossils of the Lingula flags or zone Primordiale *Paradoxides* and *Conocephalus* from North America.

In Quart. Jour. Geol. Soc. London, vol. 15, 1859, p. 551, 4 figs.

Paradoxides bennetti, *Conocephalus antiquatus*, *Asaphus* or *Olenus* sp.?

—— New Silurian Crustacea.

In Annals Mag. Nat. Hist., 3d series, London, vol. 5, 1860, p. 153, figures.

Ceratiocaris, *Dictyocaris* n. g., *Physocaris* n. g.

—— On the fossils from the High Andes, collected by David Forbes.

In Quart. Jour. Geol. Soc. London, vol. 17, 1861, p. 62, pls. 4, 5.

Proetus (*Cryphæus*) *pentlandi*, *Homalonotus linares*, *H.* sp.?, *Beyrichia forbesii*, *Phacops latifrons* Bronn.

—— On some of the higher Crustacea from the British Coal Measures.

In Quart. Jour. Geol. Soc. London, vol. 17, 1861, p. 528, figs. 1-8.

Anthrapalæmon n. g., *Palæocrangon* n. g. Name changed to that of *Crangopsis*. See same journal, vol. 19, p. 80.

—— Crustacea in the Coal Measures.

In London, Edinb., Dublin Philos. Mag., vol. 22, 1861, p. 325.

Anthrapalæmon.

This is merely a notice of the article referred to in the Quart. Jour. Geol. Soc., vol. 17, 1861, p. 528.

—— Description of *Uronectes* (*Gamponyx*) *socialis* in the Rev. T. Brown's paper, "Mountain limestone and Lower Carboniferous rocks of the Fifeshire coast." (*)

In Trans. Royal Soc. Edinb., vol. 22, pt. 2, 1861, p. 394.

—— A monograph of British Trilobites.

In Palæont. Soc. London, vol. 16, 1862, pp. 1-83, pls. 1-6, pt. 1.

Phacops, subgenera *Trimerocephalus* McCoy, *Phacops* Emm., *Acaste* Gold., *Chasmops* McCoy, *Odontochile* Corda, *Cryphæus* Green.

Cheirurus, subgenera *Crotalocephalus* Salter, *Cheirurus* Beyrich, *Eccoptochile* Corda, *Actinopeltis* Corda, *Sphærexochus* Beyrich.

Amphion Pander.

Salter (J. W.)—Continued.

—— On some fossil Crustacea from the Coal Measures and Devonian rocks of New Brunswick, Nova Scotia, and Cape Breton.

In London, Edinb., Dublin Philos. Mag., 4th series, vol. 24, 1862, p. 166.

—— A monograph of British Trilobites. Pt. 2. Pp. 81–128, pls. 7–19.

In Palæont. Soc. London, vol. 17, 1863.

Calymene, *Homalonotus*, subgenera *Brongniartia* Salter (not *Brongniartia* Eaton), *Trimerus* Green, *Dipleura* Green, *Kœnigia* Salter, *Burmeisteria* Salter; *Ogygia*, *Staurocephalus*, *Deiphon*, *Amphion*.

—— On some fossil Crustacea from the Coal Measures and Devonian rocks of British North America.

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 75, figs. 1–12.

Amphipeltis n. g., *Diplostylus* n. g., *Eurypterus*, *Palæocrangon*.

The author herein changes the name *Palæocrangon* Salter to that of *Crangopsis*.

—— On some species of *Eurypterus* and allied forms.

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 81, 8 wood-cuts.

Eurypterus scouleri, *E.* (*Arthropleura?*) *mammatus*, *E.?* (*Arthropleura*) *ferox*.

—— On Peltocaris, a new genus of Silurian Crustacea.

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 87.

Peltocaris n. g., *Hymenocaris*, *Ceratiocaris*, *Dictyocaris*, *Dithyrocaris*, *Arges*, *Apus*, *Nebalia*, *Estheria*, *Leperditia*, *Beyrichia*.

—— On some tracks of Lower Silurian Crustacea.

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 92, figures.

—— Note on the Skiddaw slate fossils.

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 135, figures.

Caryocaris n. g.

—— On the discovery of Paradoxides in Britain.

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 274.

Paradoxides davidis.

—— On a new Crustacean from Glasgow Coal Field.

In Quart. Jour. Geol. Soc. London, vol. 19, 1863, p. 519, figs. 1, 2.

Palæocarabus russellianus.

—— A monograph of British Trilobites. Pt. 3. Pp. 129–179, pls. 15–25.

In Palæont. Soc. London, vol. 18, for 1864 (London, 1866).

Salter (J. W.)—Continued.

Ogygia, subgenera *Barrandia*, and *Homalopteon*; *Niobe*, *Asaphus*, subgenera *Ptychopyge*. *Basilicus*, *Megalaspis*, *Isotelus*, *Cryptonymus*, *Symphysurus*, *Brachyaspis*, and *Nileus*; *Stygina*, *Psilocephalus* n. g.

—— Figures and descriptions illustrative of British organic remains. Decade XI. Trilobites (chiefly Silurian).

In Mem. Geol. Survey United Kingdom, London, 1864, 10 pls.

Paradoxides, *Angelina*, *Olenus*, *O.* (*Leptoplastus*), *O.* (*Peltura*), *O.* (*Sphærophthalmus*), *O.* (*Parabolina*), *Conocoryphe*, *Phacops* (*Trimerocephalus*), *Salteria* n. g., *Stygina*, *Asaphus*, *Æglina*, *Staurocephalus*, *Agnostus*, *A.* (*Condylopyge*), *A.* (*Trinodus*), *A.* (*Phalacroma*).

The article on *Salteria primæva* n. g. et sp., pl. 6, was edited by P. Wyville Thomson.

—— On some fossils from the Lingula flags of Wales.

In Quart. Jour. Geol. Soc. London., vol. 20, 1864, p. 233, pl. 13.

Paradoxides, *Anopolenus* n. g., *Conocoryphe*, *Holocephalina* n. g., *Microdiscus*, *Agnostus*, *Leperditia*.

—— Note on the fossils from the Budleigh Sandstone Pebble bed.

In Quart. Jour. Geol. Soc. London, vol. 20, 1864, p. 286, pl. 15.

Phacops incertus, *Calymene tristani*, *Homalonotus brongniarti*, *Myocaris* n. g.

For detailed description of Myocaris, see Geol. Mag., vol. 1, London, 1864, p. 11, fig. 4.

—— On the new genus *Anopolenus*.

In Geol. Mag., vol. 1, London, 1864, p. 6.

Anopolenus n. g., *Myocaris*.

—— Catalogue of the Museum of Practical Geology of London. London, 1865.

—— and **Woodward (Henry)**. Chart of fossil Crustacea, accompanied by a descriptive catalogue of all the genera and species figured. London, 1865, pls. 3 and 4.

Permian: *Prosopiniscus*, *Dalmanites? kablíktæ*, *Estheria*, *Kirkbya*, *Bairdia*, *Cytherideis*, *Cythere*, *Limulus*.

Coal: *Palæocarabus*, *Pygocephalus*, *Uronectus* (*Gampsonyx*), *Diplostylus*, *Phillipsia*, *Estheria*, *Beyrichia*, *Kirkbya*, *Leperditia*, *Candona*, *Leaia*, *Arthropleura*, *Eurypterus*, *Limulus?* (*Belinurus*).

Mountain Limestone: *Palæocrangon*, *Brachymetopus*, *Griffithides*, *Phillipsia*, *Dithyrocaris*, *Cyclus*, *Estheria*, *Cythere*, *Cypridina*, *Cyprella*, *Cypridella*, *Entomoconchus*, *Beyrichia*, *Bairdia*, *Leperditia*, *Eurypterus*, *Limulus? trilobitoides*.

Devonian: *Amphipeltis*, *Gitocrangon*, *Campecaris*, *Proetus*, *Encrinurus*, *Bronteus*, *Phacops*, *Cyphaspis*, *Arges*, *Typhomiscus*, *Homalonotus*, *Harpes*, *Cypridina*, *Estheria*, *Leperditia*, *Ento-*

Salter (J. W.)—Continued.

mis, Cypridina, Beyrichia, Bostrichopus, Eurypterus, Pterygotus.

Upper Silurian: *Bronteus, Illænus, Cyphaspis, Proetus, Aulacopleura, Phacops, Encrinurus, Acidaspis, Cheirurus, Homalonotus, Deiphon, Calymene, Harpes, Dictyocaris, Beyrichia, Ceratiocaris, Leperditia, Stylonurus, Pterygotus, Hemiaspis, Slimonia, Bunodes.*

Lower Silurian: *Asaphus, Stygina, Nileus, Illænus, Æglina, Ogygia, Agnostus, Niobe, Phacops, Trinucleus, Ampyx, Sphærexochus, Dionide, Eccoptochile, Placoparia, Lichas, Cybele, Acidaspis, Calymene, Staurocephalus, Remopleurides, Cyphoniscus, Atops, Triarthrus, Cory nexochus, Centropleura, Monocephalus, Peltocaris, Beyrichia, Cytheropsis, Protichnites.*

Cambrian: *Agnostus, Sao, Anomocaris, Dolichometopus, Anpocaris, Solenopleura, Ellipsocephalus, Arionellus, Conocoryphe, Olenus, Acerocaris, Hydrocephalus, Paradoxides, Lonchocephalus, Dikelocephalus, Palæopyge.*

See also Rept. 35th Meeting Brit. Assoc. Adv. Sci., 1865, Trans. of Sec., p. 79; Geol. Mag., vol. 2, London, 1865, p. 468.

—— and **Blanford** (H. F.) Palæontology of Nib, in the northern Himalayas. Calcutta, 1865.

—— On some additional fossils from the Lingula flags, with a note on the genus *Anopolenus*, by Henry Hicks.

In Quart. Jour. Geol. Soc. London, vol. 21, 1865, p. 476.

Anopolenus, Conocoryphe, Microdiscus, Holocephalina, Agnostus, Erinnys n. g.

—— On the fossils of North Wales.

In Mem. Geol. Survey Gt. Brit., vol. 3, London, 1866, p. 239, 37 pls.

Dikelocephalus, Olenus, Parabolina, Conocoryphe, Angelina, Homalonotus, Lichas, Trinucleus, Dionide, Ampyx, Asaphus, Niobe, Æglina, Cheirurus, Encrinurus, Illænus, Agnostus, Psilocephalus, Beyrichia, Hymenocaris.

—— A monograph of British Trilobites. Pt. 4. Pp. 177–216, pls. 25–30.

In Palæont. Soc., vol. 20, 1867.

Ogygia, Barrandia, Illænus, subgenera *Octillænus, Panderia, Dysplanus, Illænus, Ectillænus, Hydrolænus, Illænopsis,* and *Bumastus.* Family *Bronteidæ.*

—— A monograph of British Trilobites.

This work forms different parts of the Palæont. Soc. London, volumes for 1862–'67, as separately itemized in this connection.

—— On *Saccocaris major.*

In Rept. Proc. Geol. Polytech. Soc. West Riding of Yorkshire (for 1867), vol. 4, 1868, p. 588.

—— and **Hicks** (Henry). On some fossils from the Menevian group.

In Quart. Jour. Geol. Soc. London, vol. 25, 1869, p. 51, pls. 2, 3.

Salter (J. W.)—Continued.

Paradoxides, Plutonia n. g., *Conocoryphe.*

In a note on p. 52, Mr. J. W. Salter suggests the new generic name of *Plutonia,* but leaves the description for another article.

A species of this genus was afterwards described and figured in the same journal, vol. 27, 1871, p. 299, pl. 15, figs. 1–8, under the name of *Plutonia sedgwicki* Hicks. This large species has affinities with the genera *Paradoxides* and *Anopolenus* in the form of its glabella, but differs, according to Hicks, "in having the whole surface covered with coarse tubercles or spines." The term *Plutonia* is objectionable, inasmuch as it was used in 1864 for a genus of the Mollusca.

—— Catalogue of the collection of Cambrian and Silurian fossils contained in the Geological Museum of the University of Cambridge, 1873.

—— and **Etheridge** (R.) On the fossils of North Wales.

In Geology of North Wales, with an appendix on the fossils by J. W. Salter, revised and added to by R. Etheridge; Mem. Geol. Survey Gt. Brit., vol. 3, London, 1881, 2d ed., 623 pp., 113 illustrations, 2 geol. maps, 26 plates of fossils.

Paradoxides, Plutonia, Anopolenus, Dikelocephalus, Olenus,, (Sphærophthalmus), Conocoryphe, Angelina, Arionellus, Phacops, Calymene, Homalonotus, Lichas, Trinucleus, Ampyx, Dionidæ, Æglina, Asaphus, Ogygia, Barrandia, Niobe, Illænus, Illænopsis, Cheirurus, Placoparia, Encrinurus, Cybele, Agnostus, Microdiscus, Carausia, Holocephalina, Neseuretus, Psilocephalus, Hymenocaris, Lingulocaris, Ceratiocaris, Entomis, Beyrichia, Leperditia.

—— Monograph of British Trilobites from the Cambrian, Silurian, and Devonian formations. Pt. 5.

Palæont. Soc. London, vol. 37, 1883, pp. 215, and index, 3 figs.

Illænus bowmanni?, I. crassicauda, I. (Bumastus) sp.?

—— See **Huxley** (T. H.) and **Salter** (J. W.). Also **Salter** (J. W.) and **Sharpe** (D.).

Sars (M.) Ueber einige neue oder unvollständig bekannte Trilobiten.

In Isis (oder Encycl. Zeitung), Oken, 1833, p. 33.

Scheuchzer (J. J.) Specimen lithologiæ Helvetia. Turici, 8vo, 1702. (*)

—— Meteorologia et Orytographia Helvetica, oder Beschreibung der Luftgeschichten, Steinen, Metallen, etc. Turici, 1718. (*)

Schlotheim (E. Fr. von). Beschreibung einer seltenen Trilobiten-Art.

In Taschenbuch für gesam. Mineral., Leonhard, 1810, pl. 1, figs. 1-6.

Trilobiten cornigerus Schloth.

—— Nachträge zur Petrefactenkunde. II. Gotha, 1823, pl. 22.

1. *Trilobites blumenbachii*, 2. *T. tristani*, 3. *T. variolatus*, 4. *T. macrophthalmus*, 5. *T. sulzeri*, 6. *T. hoffi*, 7. *T. cornigerus*, 8. *T. de buchii*, 9. *T. hausmani*, 10. *T. schroeti*, 11. *T. caudatus*, 12. *T. laticauda*, 13. *T. guettardi*, 14. *T. desmarestii*, 15. *T. tessini*, 16. *T. spinulosus*, 17. *T. scaraboides*, 18. *T. gibbosus*, 19. *T. laciniatus*, 20. *T. sphærocephalus*, 21. *T. pisiformis*, 22. *T. granulatus*, 23. *T. punctatus*, 24. *T. mucronatus*, 25. *T. bucephalus*, 26. *T. crassicauda*, 27. *T. tentaculatus*, 28. *T. problematicus*, 29. *T. bitumenosus*.

—— Beschreibung einiger abgebildeten Arten von Echinosphæriten und Trilobiten. (*)

In Isis (oder Encycl. Zeitung), Oken, 1826, p. 309, pl. 1, figs. 8, 9; also Féruss., Bull., 1827, vol. 12, p. 406.

Tril. esmarcki, *T. granum* (*Agnostus*).

Schmid (E. E.) Die kleineren organischen Formen des Zechsteinkalkes von Selters in der Wetterau.

In Neues Jahrbuch für Mineral., 1867, p. 576, plate.

Cythere.

Schmidt (Fr.) Untersuchungen über die silurische Formation von Ehstland, Nord-Livland und Oesel.

In Archiv Naturk. Liv-, Ehst- u. Kurl., Dorpat, vol. 2, 1858-'59, pp. 443, 445, 448, 453, 461, 463.

—— Miscellanæ Silurica. I. Ueber die russischen silurischen Leperditien mit Hinzuziehung einiger Arten aus den Nachbarländern.

In Mém. Acad. Imp. Sci. St.-Pétersbourg, vol. 21, No. 2, 1873, 1 pl.

Leperditia, *Isochilina*.

—— Einige Bemerkungen über die podolisch-galizische Silurformation und deren Petrefacten. St. Petersburg, 1875, 1 pl.

Proetus, *Cyphaspis*, *Phacops*, *Calymene*, *Encrinurus*, *Sphærexochus*, *Illænus* (*Bumastus*), *Leperditia*, *Eurypterus*, *Pterygotus*.

—— Revision der ost-baltischen silurischen Trilobiten, nebst geognostischer Uebersicht des ost-baltischen Silurgebiets.

In Mém. Acad. Imp. Sci. St.-Pétersbourg, vol. 30, No. 1, 1881, 16 pls.

Phacopidæ, genera, *Phacops*. *Acaste*, *Pterygometopus* n. g., *Chasmops*. Cheiruridæ, genera, *Cheirurus*, *Cyrtometopus*, *Sphærexochus*, *Pseudosphærexochus* n. g., *Nieszkowskia* n. g., *Amphion*, *Diaphanometopus* n. g., Encrinuridæ *Cybele*, *Encrinurus*.

Schmidt (Fr.)—Continued.

—— and **Jones** (T. Rupert). On some Silurian Leperditia.

In Annals Nat. Hist., 4th series, vol. 9, London, 1882, p. 168.

—— Miscellanæ Silurica. III. 1. Nachtrag zur Monographie der russischen silurischen Leperditien. 2. Die Crustaceenfauna der Eurypterenschichten von Rootziküll auf Oesel.

In Mém. Acad. Imp. Sci. St.-Pétersbourg, vol. 31, No. 5, 1883, 9 pls.

Leperditia, *Bunodes*, *Pseudoniscus*, *Eurypterus*, *Pterygotus*, *Ceratocaris*.

—— and **Jones** (T. Rupert). See **Jones** (T. Rupert) and **Schmidt** (Fr.).

—— Ueber einige neue ostsibirische Trilobiten und verwandte Thierformen.

In Bull. Acad. Sci. Imp. St.-Pétersbourg, vol. 30, No. 4, 1886, p. 502.

Agnostus, *Phacops*, *Proetus*, *Cyphaspis*, *Eurypterus*.

Schrenk (G. A.) Uebersicht des obern-silurischen Schichten-Systems Liv- und Ehstlands, etc.

In Archiv Naturk. Liv-, Ehst- u. Kurl., Dorpat, vol. 1854, pp. 35 and 86.

Leperditia.

Scouler (John). Description of a fossil crustaceous animal. (*)

In Edinb. Jour. Nat. Geogr. Sci., vol. 3, 1831, p. 352, pl. 10.

The author describes in this article, under the new generic name of *Eidothea*, certain fragments of an *Eurypterus*.

—— Account of some fossil Crustacea which occur in the coal formation (*Argas*).

In Record of Geol. Sci. (Thomson's), vol. 1, 1835, p. 136.

According to Capt. J. E. Portlock (Rept. Geol. Londonderry, etc., 1843, p. 313), "Dr. John Scouler first noticed this remarkable Crustacean found by him in the Carboniferous strata of Paisley; and depending as a principal character on the lateral caudal appendages, he pointed out its analogy to the genera *Cyclops* and *Apus*; and again, at the meeting of the British Association at Glasgow, he described two species, one of which, *Argas tricornis*, in all probability depends on an illusive appearance produced by the overlapping of the crust of different individuals. * * * Dr. John Scouler having subsequently altered his view of the affinities of the genus, he now considers it a bi-valved Crustacean, distinguished by not being able to retract the tail within the shell, and hence has named it Dithy-

Scouler (John)—Continued.

rocaris, or bivalved shrimp, abandoning the original name as one already pre-occupied."

The Rept. 10th Meeting Brit. Assoc. Adv. Sci., 1840, held at Glasgow, does not contain in the index Dr. Scouler's name or that of the genus *Argas* or *Dithyrocaris*. In the 5th Rept. of the "Committee on the Fossil *Phyllopoda* of the Palæozoic Rocks," 1887, the genus *Dithyrocaris* Scouler is quoted on the authority of Captain Portlock as follows: "*Dithyrocaris* Scouler in Portlock's Geol. Report, Londonderry, etc., 1843," p. 313.

Scudder (Samuel H.) ***Rhachura***, a new genus of fossil Crustacea.

In Proc. Boston Soc. Nat. Hist., vol. 19, 1878, p. 296, pl. 9, figs. 3, 3 a.

In the 5th Rept. to the Brit. Assoc. Adv. Sci., 1887, on the fossil *Phyllopoda* by the committee, consisting of Mr. R. Etheridge, Dr. H. Woodward, and Prof. T. Rupert Jones this new genus of S. H. Scudder is referred to as probably of that of *Dithyrocaris* Scouler, 1843.

Shaler (N. S.) and **Foerste** (A. F.) Preliminary description of North Attleborough fossils.

In Bull. Mus. Comp. Zoöl. Harvard Coll., vol. 16, No. 2, 1888, Geol. Series, vol. 2, 1888, p. 27, 2 pls.

Paradoxides, Ptychoparia, Microdiscus.

Sharpe (Daniel). On the geology of the neighborhood of Oporto, including the Silurian, coal, and slates of Vallongo.

In Quart. Jour. Geol. Soc. London, vol. 5, 1849, p. 142, pl. 6.

Isotelus powisii Port., *Illænus lusitanicus* Sharpe.

—— Description of the new species of Zoophyta and Mollusca. Appendix B to an article on the Carboniferous and Silurian formations of the neighborhood of Bussaco, in Portugal, by C. Ribeiro.

In Quart. Jour. Geol. Soc. London, vol. 9, 1853, p. 146.

Dithyrocaris? longicauda Sharpe.

Shumard (B. F.) Palæontology. Crustacea.

In 1st and 2d Ann. Repts. of the Geol. Survey of Missouri (Swallow), 1855, pt. 2, p. 195, pl. B.

Proetus, Cyphaspis, Phillipsia, Dalmania, Calymene, Acidaspis, Encrinurus, Cythere.

—— Notice of new fossils from the Permian strata of New Mexico and Texas, collected by Dr. George G. Shumard, geologist of the U. S. Government expedition for obtaining water by means of artesian wells along the 32d parallel, under the direction of Capt. John Pope, U. S. Corps of Top. Eng.

Trans. Acad. Sci. St. Louis, vol. 1, 1858, p. 290.

Phillipsia perannulata, pl. 11, fig. 10.

—— The Primordial zone of Texas, with descriptions of new fossils.

In Am. Jour. Sci., 2d series, vol. 32, 1861, p. 213.

Dikelocephalus, Conocephalites, Arionellus, Agnostus.

—— Notice of some new and imperfectly known fossils from the Primordial zone (Potsdam sandstone and calciferous sand group) of Wisconsin and Missouri.

In Trans. Acad. Sci. St. Louis, vol. 2, 1863, p. 101.

Dikelocephalus, Arionellus, Conocephalites, Agnostus.

—— Descriptions of new Palæozoic fossils.

In Trans. Acad. Sci. St. Louis, vol. 2, 1863, p. 108.

Proetus proutii.

Sjogren (A.) Anteckningar om Öland, ett bidrag till Sveriges geologi.

In Öfversigt K. Vet.-Akad. Förhandl. Stockholm, vol. 8, 1851, No. 2, p. 36.

Enumerates species of the following genera: *Remopleurides, Paradoxides, Ellipsocephalus, Olenus, Phacops, Calymene, Homalonotus, Lichas, Ampyx, Cheirurus, Asaphus, Illænus, Nileus, Battus, Cytherina.*

—— Om några försteningar i Ölands Kambriska lager.

In Geol. Föreningens Stockholm Förhandl., vol. 1, No. 5, 1871, 1 pl.

Paradoxides, Ellipsocephalus, Conocoryphe, Agnostus.

Sowerby (J. D. C.) Description of *Homalonotus knighti* in Adam Sedgwick and R. I. Murchison's article on the older formation on the right bank of the Rhine, etc.

In Trans. Geol. Soc. London, 2d series, vol. 6, 1842, p. 275, figure, pl. 38, fig. 17.

Stainer (X.) Note sur un Trilobite nouveau.

In Annales Soc. Géol. Belgique; Mémoires, vol. 14, 1887.

Dechenella.

Steinhart (E. T. G.) Die bis jetzt in preuss. Geschieben gefundenen Trilobiten.

In Beiträge zur Natur. Preuss., herausgegeben von der phys.-ökonomischen Gesell., Königsberg, 1874.

Steinhart (E. T. G.)—Continued.

Harpes, *Proetus*, *Cyphaspis*, *Phacops*, *Chamops*, *Calymene*, *Dalmania*, *Licha*, *Ampyx*, *Asaphus*, *A.* (*Basilicus*), *Illænus*, *Nileus*, *Bumastus*, *Acidaspis*, *Ceraurus*, *Sphærexochus*, *Zethus*, *Encrinurus*, *Agnostus*.

Steininger (Jean). Observations sur les fossiles du calcaire intermédiaire de l'Eifel.

In Mém. Soc. Géol. France, vol. 1, 1831, p. 331, pl. 21.

Calymene brongniarti, *C. latreilii*, *C. schlotheimii*, *C. tristani*, *Proetus* n. g., *P. cuvieri*, *Olenus punctatus*, *Asaphus mucronati*, *A. laticauda*.

Sternberg (Kasper *Graf* von). Uebersicht der in Böhmen dermalen bekannten Trilobiten.

In Verhandl. mineral. Gesell. vaterländisch. Mus. Böhm., 1825, p. 69, pls. 2, 3; Isis (oder Encycl. Zeitung), Oken, vol. 7, 1827, p. 627.

Trilobites macrophthalmus, *T. hausmanni*, *T. sulzeri*, *T. hoffi*, *T. tessini*.

—— Ueber die Gliederung und die Füsse der Trilobiten.

In Isis (oder Encycl. Zeitung), Oken, 1830, pp. 516, 563, pl. 5, figs. 1–3.

—— Ueber böhmische Trilobiten.

In Verhandl. mineral. Gesell. vaterländisch. Mus. Böhm., 1833, p. 17.

Olenus longicaudatus, *Trilobites spinosus*, *Olenus pyramidalis*, *O. latus*, *Conoceph. costatus*, *Trilobites sulzeri*, *T. zippii*, *Ellipsocephalus ambigus*, *Trilobites hoffi*, *Otarion diffractum*, *Trilobites sternbergi*, *T. ungula*, *T. ornatus*.

—— Ueber die böhmischen Trilobiten mit Beziehung auf die Arbeiten von Boeck und Zenker darüber.

In Neues Jahrbuch für Mineral., 1835, p. 727.

Olenus longicaudatus, *O. latus*, *Trilobites minor*, *T. gracilus*, *T. sulzeri*, *T. hoffi*, *T. sternbergi*, *T. angula*, *T. ornatus*, *T. gibbosus*, *Otarion diffractum*.

Stescheglof. Treatise on the Trilobites of Petersburg. (*)

In Jour. für neue Entdeckungen in der Phys., Chem., Natur., und Technologie, St. Petersburg, Nos. 1, 2, 1827, pl. 8. (In Russian.)

Deucalion n. g.

Stock (Thomas). Note on the occurrence of *Anthrapalæmon etheridgi* B. N. Peach, in the ironstones above the sandstones at Craigleith Quarry, near Edinburgh.

In Trans. Edinb. Geol. Soc., vol. 4, 1881, p. 97.

—— Note on the occurrence of the remains of Decapod Crustaceans in the Wardie shales.

Stock (Thomas)—Continued.

In Trans. Edinb. Geol. Soc., vol. 4, 1882, p. 219.

Palæocrangon, *Anthrapalæmon*.

Stoddart (W. W.) On Trilobites.

In Proc. Bristol Nat. Sci., vol. 1, 1866, p. 82.

Stokes (Charles). On a Trilobite from Lake Huron.

In Trans. Geol. Soc. London, 2d series, vol. 1, 1822, p. 208, pl. 28.

Strauss-Durckheim (H.) Ueber *Estheria dahalacensis* Rüffell, eine neue Gattung aus der Familie der Daphniden.

In Mus. Senckenbergianum, vol. 2, 1837, pp. 119–128, pls. 7, 7 b.

The name *Estheria* was originally proposed by Dr. Rüffell for a species brought from Abyssinia; its description, with figures of typical species, appeared in the above cited work. In the same year Mr Audouin (Annales Soc. Entom., vol. 6) proposed that of *Cyzicus* for similar species, without a generic description. The simultaneous publication of these two generic names for the same genus lead Mr. Joly (Annales Sci. Nat., 2d series, vol. 17, 1842, p. 293) to propose that of *Isaura*. *Estheria* is now generally used by authors.

Symonds (W. S.) On a Phyllopod Crustacean in the Upper Ludlow rock of Ludlow.

In Rept. 25th Meeting Brit. Assoc. Adv. Sci., 1855, Trans. of Sec., p. 98.

Hymenocaris vermicauda.

—— On a new species of *Eurypterus* from the Old Red Sandstone of Herefordshire.

In Rept. 27th Meeting Brit. Assoc. Adv. Sci., 1857, Trans. of Sec., p. 93.

—— On a new species of *Eurypterus* from the Old Red Sandstone of Herefordshire.

In Edinburgh New Philos. Jour., vol. 6, 1857, p. 257.

Tate (George). Farne Islands.

In Proc. Berwickshire Nat. Club, vol. 3, No. 7, p. 222.

Griffithides farnensis.

Thomson (P. Wyville). On some species of *Acidaspis* from the Lower Silurian beds of the south of Scotland.

In Quart. Jour. Geol. Soc. London, vol. 13, 1857, p. 206, pl. 6.

—— Figures and descriptions illustrative of organic remains.

In Geol. Survey United Kingdom, decade XI, London, 1864, pl. 6.

Salteria primæva Wyv. Thomson n. g. and sp.

Tietze (E.) Ueber die devonischen Schichten von Ebersdorf unweit Neurode in der Grafschaft Glatz.

In Geognostisch - palæont. Monographie, Stuttgart, 1870, 2 pls.

Harpes, Proetus, Phacops, Cypridina.

Todd (J. E.) A description of some fossil tracks from the Potsdam sandstone.

In Trans. Wisconsin Acad. Sci., vol. 5, 1882, p. 276, 1 fig.

Törnquist (S. L.) Om lagerföljden i Dalarnes under-Siluris a bildningar.

In Lunds Univ. Årsskrift, vol. 3, 1867.

—— Berättelse om en geologisk resa genom Skånes och Östergötlands paleozoiska trakter sommaren 1875, etc.

In Öfversigt Kongl. Svenska Vet. Akad. Förhandl., 1875, No. 10, p. 43.

Paradoxides, Olenus, Phacops, Calymene, Asaphus, Illænus, Trinucleus, Lichas, Agnostus.

—— Undersökningar öfver Siljansområdets Trilobitfauna.

In Svenska Geol. Undersökning, Stockholm, series C, No. 66, 1884, 2 pls.

Harpes, Remopleurides, Triarthrus, Proetus, Cyphaspis, Arethusina, Isotelus, Phacops, Phacops (Pterygometopus), Phacops (Chasmops), Calymene, Homalonotus, Lichas, Trinucleus, Ampyx, Deiphon, Asaphus, Megalaspis, Niobe, Acidaspis, Cheirurus, Sphærexochus, Cyrtometopus, Pseudosphærexochus, Nieszkowskia, Sphærexocoryphe, Pliomera, Encrinurus, Cybele, Bronteus, Illænus, Nileus, Agnostus. Telephus.

Torrubia (J.) Aparato para la historia natural española. Vol. 1. Madrid, 1754, p. 83, par. 13, No. 96.

The Rev. Father Joseph Torrubia has the merit of referring the Trilobites to the class Crustacea.

Traquair (R. H.) Occurrence of Trilobites in the Carboniferous limestone of Fifeshire. (*)

In Proc. Royal Phys. Soc. Edinburgh, vol. 2, 1858–'61, p. 253.

—— On the *Griffithides mucronatus* McCoy.

In Jour. Royal Geol. Soc. Ireland, vol. 2, 1869, p. 213, plate.

Trautschold (H.) Die Trilobiten als Erstgeborene.

In Bull. Soc. Imp. des Naturalistes, Moscou, 1872, p. 297.

—— Die Kalkbrüche von Mjatschkowa. Eine Monographie des oberen Bergkalkes.

In Mém. Soc. Imp. des Naturalistes, Moscou, vol. 13, 1874, p. 276.

Trautschold (H.)—Continued.

Phillipsia globiceps, P. grunewaldti, P. pustulata.

Trenkner (M. W.) Palæontolog. Novitäten vom nordwestl. Harze. Halle, 1867–'69, 8 pls.

Harpes, Cyphaspis, Bronteus, Entomis.

Tristan (J.) Sur un crustacé renfermé dans quelques schistes, notamment dans ceux des environs de Nantes (dépt. de la Loire-Inférieure) et d'Angers (dépt. de Maine-et-Loire).

In Jour. Mines, vol. 23, 1808, p. 2.

(*Calymene tristani* Brong.)

Tromelin (G.) and **Lebesconte** (P.) Observations sur les terrains primaires du nord du dépt. d'Ille-et-Vilaine et de quelques autres parties du massif breton.

In Bull. Soc. Géol. France, 3d series, vol. 4, 1875–'76, p. 583.

Dalmanites, Calymene, Homalonotus, Trinucleus.

Tschernyschew. Die Fauna des mittl. und oberen Devon am Westabhange des Urals.

In Mém. du Comité Géol., vol. 3, No. 3, 1887, p. 14.

Dechenella.

Tullberg (S. A.) Om *Agnostus*-arterna i de Kambriska aflagringarne vid Andrarum.

In Svenska Geol. Undersök., series C, No. 42, 1882, 2 pls.

Ulrich (E. O.) Description of some species of fossils from the Cincinnati group.

In Jour. Cincinnati Soc. Nat. Hist., vol. 1, 1878–'79, p. 92.

Trinucleus bellulus.

—— Description of a Trilobite from the Niagara group of Indiana.

In Jour. Cincinnati Soc. Nat. Hist., vol. 2, 1879, p. 131, 3 figs.

Calymene nasuta.

—— Descriptions of new genera and species from the Lower Silurian about Cincinnati.

In Jour. Cincinnati Soc. Nat. Hist., vol. 2, 1879, p. 8, pl. 9.

Beyrichia, Leperditia.

Verneuil (Édouard). Sur les fossiles dévoniens des environs de Sabero dans les montagnes de Léon.

In Bull. Soc. Géol. France, 2d series, vol. 7, 1850, p. 155, pl. 3.

Cryphæus calliteles, Phacops latifrons, Homalonotus pradianus.

Verneuil (Édouard)—Continued.

—— Géologie de la Russie d'Europe et des montagnes de l'Oural, par R. I. Murchison, Édouard de Verneuil et le comte Alex. de Keyserling. Vol. 2. 3 part. Paléontologie. Londres et Paris, 1845, 50 pls.

Calymene edisi, *C. fischeri*, *Asaphus expansus*, *Phillipsia eichwaldi*, *P. uralica* n. s.

—— and Barrande (Joachim). Description des fossiles trouvés dans les terrains silurien et dévonien d'Almaden d'une partie de la Sierra Morena et des montagnes de Tolède.

In Bull. Soc. Géol. France, 2d series, vol. 12, 1854–'55, p. 904, pls. 23, 24.

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—— Description of a new Crustacean from the Upper Silurian of Georgia, with remarks on *Calymene clintoni*.

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Fig. 3, *Calymene clintoni*, has been referred by A. F. Foerste (Bull. Den. Univ., vol. 2, 1887, p. 95, pl. 8, figs. 12, 16) to *Calymene vogdesi*.

—— A new Trilobite.

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—— Description of a new Crustacean from the Clinton group of Georgia, with remarks upon others. New York City, 1886, 5 pp., 4 figs.

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—— The genera and species of North American Carboniferous Trilobites.

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—— Description of two new species of Carboniferous Trilobites.

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Phillipsia, *Griffithides!*

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In Verhandl. russ. k. mineral. Gesell. zu St. Petersburg, 1847, p. 1, pl. 1.

The author redescribed the genus *Zethus* Pander and its type *Zethus verrucosus*, placing *Cybele bellatulus* Eichw. under the same genus.

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—— Ueber die mit glatten Rumpfgliedern versehenen russischen Trilobiten, nebst einem Anhange über Bewegungsorgane und über das Herz derselben.

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—— Ueber einige neue ehstländische Illænen.

In Mém. Acad. Imp. Sci. St.-Pétersbourg, vol. 8, No. 9, 1864, 2 pls.

—— Ueber Herrn von Eichwald's Beitrag zur näheren Kenntniss der Illænen, etc.

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This work was published and distributed in 1818 as a separate article, in advance of the Nova Acta Reg. Soc. Sci., vol. 8, 1821.

—— Petrificata telluris Suecana examinata a Georgio Wahlenberg.

In Nova Acta Reg. Soc. Sci., Upsal., vol. 8, 1821, pp. 1-116, pls. 1-4.

Entomostracites expansus Linn., *E. crassicauda* n. s., *E. laticauda* n. s., *E. caudatus* Brün., *E. granulatus* n. s., *E. tuberculatus* Brün., *E. punctatus* Brün., *E. laciniatus* n. s., *E. paradoxissimus* Linn. (*Paradoxides tessini*), *E. bucephalus* (hypostoma of *P. tessini*), *E. spinulosa* n. s., *E. gibbosus* n. s., *E. scarabæoides* n. s., *E. pisiformis* Linn.

—— Additamenta quædam ad petrificata telluris Suecana.

In Nova Acta Reg. Soc. Sci., Upsal., vol. 8, 1821, pp. 293-296, pl. 7.

Entomostracites crassicauda, *E. expansus*, *E. tuberculatus*, *E. caudatus*, *E. laticauda*.

Entomostracites crassicauda, pl. 7, fig. 5, has been referred by G. Holm. (De Svenska Arterna Trilobitslägetet *Illænus*, 1882, p. 55) to *Illænus esmarkii* Schlotheim.

Walch (J. E. T.) Des Trilobites dans le règne des pétrifications, ou de la conque ridée à trois lobes (concha triloba rugosa). Recueil des monumens des catastrophes que le globe de la terre a essuiées, contenant des pétrifications. (Knorr, G. W.) Vol. 3. Nuremberg, 1775, p. 105.

Walch (J. F. T.)—Continued.

See also vol. 2, 1768, section 1, p. 81; vol. 3, 1775, pp. 184, 185, 186, 193; suppl. pls. 8, 9 a, 9 b, 9 c, 9 e, 9 f. German and French editions.

This author gives the name of Trilobite to the family, a designation which has been used by all subsequent authors, with the exceptions of J. W. Dalman and C. S. Rafinesque.

Walcott (C. D.) Description of a new species of Trilobite [from Trenton Falls, New York.]

In Cincinnati Quart. Jour. Sci., vol. 2, 1875, p. 273, 2 figs.

Sphærocoryphe robustus.

—— New species of Trilobite from the Trenton limestone at Trenton Falls, N. Y.

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Remopleurides striatulus.

—— Notes on *Ceraurus pleurexanthemus* Green.

In Annals Lyceum Nat. Hist., New York, vol. 11, 1876, p. 155, pl. 11.

—— Preliminary notice of the discovery of the remains of the natatory and branchial appendages of Trilobites.

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—— Description of new species of fossils from the Trenton limestone.

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Bathyurus, *Asaphus*.

—— Notes on some sections of Trilobites from the Trenton limestone.

In 31st Rept. New York State Mus. Nat. Hist., 1879, p. 61. Advanced sheets published September 20, 1877, 1 pl.

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—— Notes upon the eggs of the Trilobites.

In 31st Rept. New York State Mus. Nat. Hist., 1879, p. 66. Advanced sheets published September 20, 1877.

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—— The Utica slate and related formations of the same geological horizon.

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Echinognathus n. g.

—— Description of new species of fossils from the Trenton group, New York.

In 35th Rept. New York State Cab. Nat. Hist., 1883, p. 206, 1 pl.

Beyrichia, *Leperditia* (*Isochilina*).

Author's edition, October 15, 1883, 8 pp., 1 pl.

—— Injury sustained by the eye of a Trilobite at the time of moulting of the shell.

In Annals Nat. Hist., 5th series, vol. 13, London, 1884, p. 69.

—— On the locomotory appendages of Trilobites.

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—— Palæontology of the Eureka district.

In Mon. U. S. Geol. Survey, vol. 8, 1884, 24 pls.

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—— On the Cambrian faunas of North America. Preliminary studies.

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Paradoxides, *Conocoryphe*, *Harttia* n. g., *Ptychoparia*, *Agnostus*, *Microdiscus*, *Agraulos*, *Protocaris* n. g.

—— Palæozoic notes: New genus of Cambrian Trilobites, *Mesonacis*.

In Am. Jour. Sci., 3d series, vol. 29, 1885, p. 328, figures.

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Figures and descriptions of species of the following genera are given, viz: *Paradoxides*, *Bathynotus*, *Mesonacis*, *Olenellus*, *Olenoides*, *Oryctocephalus* n. g., *Ptychoparia*, *Solenopleura*, *Anomocare*, *Crepicephalus*, *Dorypyge*, *Asaphiscus*, *Bathyuriscus*, *Agnostus*, *Microdiscus*, *Protypus* n. g., *Protocaris*, *Leperditia*.

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—— Cambrian fossils from Mount Stephens, North West Territory of Canada.

Am. Jour. Sci., 3d series, vol. 36, 1888, p. 161.

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—— Stratigraphic position of the Olenellus fauna in North America and Europe.

Am. Jour. Sci., 3d series, vol. 37, 1889, p. 374.

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Warder (John A.) New Trilobites.

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In Am. Jour. Sci., 3d series, vol. 6, 1873, p. 186.

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Weitenweber (W. R.) Systematisches Verzeichniss der böhmischen Trilobiten in der Sammlung des Dr. Zeidler.

In Lotos, vol. 7, 1847, pp. 5–42.

Wetherby (A. G.) Description of a new family and genus of Lower Silurian Crustacea.

Wetherby (A. G.)—Continued.

In Jour. Cincinnati Soc. Nat. Hist., vol. 1, 1878-'79, p. 162, figure, vol. 2, pl. 7, figs. 1, 1 a-g.

Enoploura balanoides.

—— Description of new fossils from the Lower Silurian and Subcarboniferous rocks of Ohio and Kentucky.

In Jour. Cincinnati Soc. Nat. Hist., vol. 4, 1881, p. 77.

Proetus, Isochilina.

White (C. A.) and **St. John** (O. H.) Preliminary notice of new genera and species of fossils. Iowa City, May 8, 1867, 3 pp.

Beyrichia lithofactor, B. lithofactor var. *velata, Cythere simplex.*

Of this small pamphlet only fifty copies were published by the Iowa State Geological Survey. Republished in Trans. Chicago Acad. Sci., vol. 1, 1867.

—— —— Description of new subcarboniferous and Coal-Measure fossils collected upon the geological survey of Iowa, together with a notice of new generic characters observed in two species of Brachiopods.

In Trans. Chicago Acad. Sci., vol. 1, pt. 1, 1867, p. 115, 2 figs.

Beyrichia petrifactor, B. petrifactor var. *velata, B. fœtoidea, Cythere simplex.*

In this article the authors give the new names of *Beyrichia petrifactor* to the species described in the preliminary notice as *B. lithofactor*, and also change the name of *B. lithofactor* var. *velata* to that of *Beyrichia petrifactor* var. *velata.*

—— Preliminary report upon invertebrate fossils collected by the expeditions of 1871, 1872, and 1873, with descriptions of new species.

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—— Report upon the invertebrate fossils collected in portions of Nevada, Utah, Colorado, New Mexico, and Arizona, by parties of the expeditions of 1871, 1872, 1873, and 1874.

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Calymene senaria, Cyphaspis christyi, Phillipsia bufo.

—— The fossils of the Indiana rocks. No. 3.

In 13th Ann. Rept. Dept. Geol. and Nat. Hist. Indiana, 1883, pt. 2, pp. 107-180, pls. 23-39.

Phillipsia (Griffithides?) scitala, P. (G.?) sangamonensis, Eurypterus (Anthraconetes) mazonensis, Anthrapalæmon gracilis, Acanthotelson stimpsoni, A. eveni, Palæocaris typus, Dithyrocaris carbonarius, Leaia tricarinata, Euproops danæ, E. colletti.

Whiteaves (J. F.) Palæozoic fossils. Vol. 3, pt. 1, 1884.

In Geol. and Nat. Hist. Survey Canada, 1884, 8 pls.

Eurypterus boylei.

—— Contributions to Canadian palæontology. Vol. 1.

In Geol. and Nat. Hist. Survey Canada, 1888.

In the author's list of fossils from the Hamilton formation of Ontario the following Crustacea are included: *Phacops bufo, Dalmanites helena, D. boothii,* and *Cythere? (Beyrichia) punctulifera.*

——. See **Matthew** (G. F.) Illustrations of the fauna of the St. John group. No. 3.

In Trans. Royal Soc. Canada, vol. 3, 1885, p. 76.

Solenopleura acadia Whiteaves.

Whitfield (R. P.) Description of new species of fossils.

In Rept. Reconnoissance from Carrol, Montana Territory, on the Upper Missouri, to the Yellowstone National Park and return, Ludlow's report, Washington, 1876.

Crepicephalus (Loganellus) montanensis, Arionellus tripunctatus.

See, also, Rept. Chief Eng. U. S. A., 1876, Appendix NN.

—— Preliminary descriptions of new species of fossils from the lower geological formation of Wisconsin.

In Ann. Rept. Geol. Survey Wisconsin, 1877, pp. 50-89.

Dicellocephalus, Conocephalites, Ptychaspis, Crepicephalus, Agraulus (Bathyurus?), Arionellus, Ellipsocephalus, Illænurus, Bronteus.

—— Preliminary report on the palæontology of the Black Hills, containing descriptions of new species of fossils from the Potsdam, Jurassic, and Cretaceous formations of the Black Hills of Dakota.

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Whitfield (R. P.)—Continued.

—— Description of new species of fossils from the Palæozoic formations of Wisconsin.

In Ann. Rept. Geol. Survey Wisconsin, 1879, pp. 44–71.

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—— New forms of fossil Crustaceans from the Upper Devonian rocks of Ohio, with descriptions of new genera and species.

In Am. Jour. Sci., 3d series, vol. 19, 1880, p. 33.

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A plate and explanation accompany the author's edition.

—— Palæontology of the Black Hills of Dakota.

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—— Palæontology.

In Geol. Wisconsin, vol. 4, 1882, pt. 3, pp. 163–363, pls. 1–27.

Dikelocephalus, Conocephalites, C. (Ptychaspis?), Ellipsocephalus, Crepicephalus, Ptychaspis, Arionellus, A. (Agraulos), Agraulos (Bathyurus?), Aglaspis, Illænurus, Asaphus, Illænus, Sphærexochus, Phacops, Bronteus, Leperditia.

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In Annals New York Acad. Sci., vol. 2, Nos. 7, 8, 1882, p. 193.

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—— On the fauna of the Lower Carboniferous limestones of Spergen Hill, Indiana, with a revision of the descriptions of its fossils heretofore published, and illustrations of the species from the original type series.

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Plates republished in 12th Rept. Geol. Nat. Hist. Indiana, 1882.

—— List of Wisconsin fossils.

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—— Notice of some new species of Primordial fossils in the collection of the Museum, and corrections of previously described species.

In Bull. Am. Mus. Nat. Hist., New York, vol. 1, No. 5, 1884, p. 139, pls. 14, 15.

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—— Notice of a very large species of *Homalonotus* from the Oriskany sandstone formation.

In Bull. Am. Mus. Nat. Hist., New York, vol. 1, No. 6, 1885, p. 193, pl. 22.

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—— Notice of geological investigations along the eastern shore of Lake Champlain, conducted by Prof. H. M. Seely and Prest. Ezra Brainerd, of Middlebury College, with descriptions of the new fossils discovered.

In Bull. Am. Mus. Nat. Hist., New York, vol. 1, No. 8, 1886, p. 293.

Sao? lamottensis n. s., *Lichas champlainensis* n. s., *Asaphus canalis* Conrad.

—— Observations on some imperfectly known fossils from the calciferous sandrock of Lake Champlain, and descriptions of several new forms.

In Bull. Am. Mus. Nat. Hist., New York, vol. 2, No. 2, 1889, p. 41, 13 pls.

Primitia gregaria, P.? cristata, P. seelyi, Bathyurus conicus, B. seelyi.

—— Additional notes on *Asaphus canalis* Conrad.

In Bull. Am. Mus. Nat. Hist., New York, vol. 2, No. 2, 1889, p. 64, pls. 11, 12.

—— Description of a new form of fossil, Balanoid Cirripede, from the Marcellus shale of New York.

In Bull. Am. Mus. Nat. Hist., New York, vol. 2, No. 2, 1889, p. 66.

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—— See **Hall** (James) and **Whitfield** (R. P.).

Wigand (Georg von). Ueber die Trilobiten der silurischen Geschiebe in Mecklenburg.

In Zeitschr. Deutsch. geol. Ges., vol. 40, 1888, p. 39, pls. 6–10.

Phacops, Lichas, L. (Hoplolichas), Illænus, Cheirurus, C. (Cyrtometopus), C. (Pseudosphærexochus), C. (Nieszkowskia), Sphærexochus, Amphion, Cybele, Encrinurus, Acidaspis.

Wiik (F. G.) Om fossilierna i Ålands silur-kalksten jemförda med de i Sverige och Estland förekommande. (*)

In Bidrag till Kännedom af Finlands Natur och Folk, pt. 35, Helsingfors, 1881.

Wilckens (C. F.) Sendschreiben, worin wahrscheinlich dargethan wird, dass die Conchilioligisten eben keine Ursache mehr haben, das Petrefact, welches bisher unter der Benennung eines *Conchitæ trilobi rugosi* bekannt geworden ist, als einen Theil ihrer Wissenschaft anzusehen. (*)

In Stralsundisches Mag., vol. 1, 1768, p. 267.

—— Nachricht von seltenen Versteinerungen, vornemlich des Thier-Reiches, welche bisher noch nicht genau genug beschieben und erklärt worden. Mit Kupfern, in drei Sendschreiben an seine Gönner und Freunde. Berlin und Stralsund, 1769, pl. 8. (*)

Williams (H. S.) On the occurrence of *Proetus longicauda* Hall in Madison County, Kansas.

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—— Notice of a new Limuloid Crustacean from the Devonian.

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Prestwichia eriensis n. s.

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—— Notice of a new Limuloid Crustacean from the Devonian formation of Erie County, Pennsylvania.

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Prestwichia eriensis.

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In Proc. Acad. Nat. Sci. Phila., vol. 14, 1862, p. 405.

Cythere crassimarginata.

—— Description of fossils from the yellow sandstone lying beneath the Burlington limestone at Burlington, Iowa.

In Proc. Acad. Nat. Sci. Phila., vol. 15, 1863, p. 2.

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—— Notice of a small collection of fossils from the Potsdam sandstone of Wisconsin and Lake Superior sandstone of Michigan.

In Am. Jour. Sci., 2d series, vol. 37, 1864, p. 226.

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—— Description of new species of fossils from the Marshall group of Michigan and its supposed equivalent in other States; with notes on some fossils of the same age previously described.

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—— and **Marcy** (O.) Enumeration of the fossils collected in the Niagara limestone at Chicago, Ill.; with descriptions of some new species.

In Mem. Boston Soc. Nat. Hist., vol. 1, 1866, p. 81, pls. 2, 3.

Lichas, Acidaspis, Bronteus, Illænus.

Winchell (N. H.) Fossils from the red quartzite at Pipestone.

In 13th Rept. Geol. Nat. Hist. Survey Minnesota, 1884, p. 65, plate.

Paradoxides barberi.

Woltersdorf (J. L.) Systema minerale. Berlin, 1748, p. 42.

The author classes the Trilobites with the Mollusca, calling them "Conchites trilobus."

Woodward (Henry). On a nearly perfect specimen of *Eurypterus lanceolatus* (Salter) from the Upper Ludlow rocks at Lesmahagow, etc.

In Geol. Mag., vol. 1, London, 1864, p. 107, pl. 5.

—— On the *Eurypteridæ* and *Xiphosura*.

In Rept. 34th Meeting Brit. Assoc. Adv. Sci., 1864, Sec. C; Geol. Mag., vol. 1, London, p. 239.

Eurypterus, Pterygotus, Slimonia, Stylonurus, Hemiaspis.

—— Descriptions of some new Palæozoic Crustacea.

In Geol. Mag., vol. 1, London, 1864, p. 196, pl. 10, wood-cuts.

Eurypterus, Pterygotus, Stylonurus.

—— On some Crustacean teeth from the Carboniferous and Upper Ludlow rocks of Scotland.

In Geol. Mag., vol. 2, London, 1865, p. 401, pl. 11.

Ceratiocaris, Dithyrocaris.

—— On some new species of Crustacea belonging to the order *Eurypteridæ*.

In Geol. Mag., vol. 2, London, 1865, p. 319; Quart. Jour. Geol. Soc. London, vol. 21, 1865, p. 482, pl. 13.

Stylonurus powriei Page, *S. scoticus* n. s.

—— On the discovery of a new genus of *Cirripedia* in the Wenlock limestone, Dudley.

In Quart. Jour. Geol. Soc. London, vol. 21, 1865, p. 486, pl. 14; Geol. Mag., vol. 2, London, 1865, p. 319.

Turrilepas n. g.

Woodward (Henry)—Continued.

—— On a new genus of *Eurypteridæ* from the Lower Ludlow rocks of Leintwardine, Shropshire.

In Quart. Jour. Geol. Soc. London, vol. 21, 1865, p. 490, pl. 14.

Hemiaspis n. g.

—— and **Salter** (J. W.) Chart of the genera of fossil Crustacea. See **Salter** (J. W.) and **Woodward** (Henry).

—— Shield bearing Crustacea, recent and fossil.

In Intellectural Observer, vol. 8, 1865, p. 321, plate.

Harpes.

—— First report on the structure and classification of fossil Crustacea.

In Rept. 35th Meeting Brit. Assoc. Adv. Sci., 1865.

—— On a new Phyllopodous Crustacean.

In Rept. 35th Meeting Brit. Assoc. Adv. Sci., 1865, Trans. of Sec., p. 78.

Discinocaris n. g., *D. browniana* Woodward.

For description and illustration of *Discinocaris*, see Quart. Jour. Geol. Soc., vol. 22, 1866.

—— On the occurrence of *Ceratiocaris* in the Wenlock limestone of England.

In Geol. Mag., vol. 3, London, 1866, p. 203, pl. 10.

—— Note on some fossil Crustacea and a Chilognathous Myriapod from the Coal Measures of the west of Scotland.

In Trans. Geol. Soc. Glasgow, vol. 2, 1866, p. 234, pl. 3, wood-cuts.

—— On a new genus of Phyllopodous Crustacean from the Moffat shales, Dumfriesshire.

In Quart. Jour. Geol. Soc. London, vol. 22, 1866, p. 503, pl. 25.

Discinocaris n. g., *D. browniana*, *Peltocaris aptychoides.*

See, also, Rept. 35th Meeting Brit. Assoc. Adv. Sci., 1865, Trans. of Sec., p. 78.

—— Second report on the structure and classification of the fossil Crustacea.

In Rept. 36th Meeting Brit. Assoc. Adv. Sci., 1866, p. 71.

Eurypterida, *Xiphosura.*

—— On some points in the structure of the *Xiphosura*, having reference to their relationship with the *Eurypteridæ.*

In Quart. Jour. Geol. Soc. London, vol. 23, 1867, p. 28, pls. 1, 2.

Eurypterida: *Pterygotus* Agas., *Slimonia* (Page) Woodward, *Stylonurus* (Page) Woodward, *Eurypterus* De Kay subgenus, *Dolichopterus* Hall, *Adelopthalmus* Jordan, *Bunodes* Eichw., *Arthropleura* Jordan, *Hemiaspis* Wood., *Exapinurus* Nieszk., *Pseudoniscus* Nieszk. Xiphosura: *Belinurus* (König) Baily, *Prestwichia* n. g., *Limulus* Müller.

Woodward (Henry)—Continued.

—— A monograph of the British fossil Crustacea of the order Mesostomata.

In Palæont. Soc. London, pt. 1, 1866; pt. 2, 1868; pt. 3, 1871; pt. 4, 1872; pt. 5, 1877, 36 pls.

Pterygotus, *Slimonia*, *Stylonurus*, *Eurypterus*, *Hemiaspis*, *Belinurus*, *Neolimulus*, *Prestwichia*, *Limulus*, *Cyclus.*

—— Third report on the structure and classification of the fossil Crustacea.

In Rept. 37th Meeting Brit. Assoc. Adv. Sci., 1867, p. 44.

Eurypterus, *Pterygotus*, *Præatya*, *Goniocypoda.*

—— Recent and fossil Crustacea; being a lecture delivered before the Geological Association, December 12, 1867.

In Geol. Mag., vol. 5, London, 1868, p. 33; Rept. Geol. Assoc., 1867; notice of lecture.

—— On a new Limuloid Crustacean (*Neolimulus falcatus*), from the Upper Silurian of Lesmahagow, Lanarkshire.

In Geol. Mag., vol. 5, London, 1868, p. 1, pl. 1.

—— On a newly discovered long-eyed *Calymene* from the Wenlock limestone, Dudley.

In Geol. Mag., vol. 5, London, 1868, p. 489, pl. 21.

—— Contributions to British fossil Crustacea.

In Geol. Mag., vol. 5, London, 1868, p. 258; also p. 353, pls. 14, 17.

Pyrgoma crustacea, *Glyphea*, and *Pseudoglyphea.*

—— On some new species of Crustacea from the Upper Silurian rocks of Lanarkshire, etc.; and further observations on the structure of *Pterygotus.*

In Quart. Jour. Geol. Soc. London, vol. 24, 1868, p. 289, pls. 9, 10.

Eurypterus (*Pterygotus*) *punctatus* Salter, *Eurypterus scorpioides* n. s., *E. obesus* n. s. *Pterygotus raniceps* n. s.

—— Fourth report on the structure and classification of the fossil Crustacea.

In Rept. 38th Meeting Brit. Assoc. Adv. Sci., 1868, p. 72, pl. 2.

Neolimulus faleatus sp. et gen. nov., *Cyclus radialis* Dekon.

—— On the occurrence of *Stylonurus* in the "cornstone" of Herefordshire.

In Rept. 39th Meeting Brit. Assoc. Adv. Sci., 1869, Trans. of sec., p. 103.

—— Note on the palpus and other appendages of an *Asaphus* from the Trenton limestone in the British Museum.

Woodward (Henry)—Continued.

In Quart. Jour. Geol. Soc. London, vol. 26, 1870, p. 486, wood-cut.

—— On the remains of a giant Isopod, *Præarcturus gigas*, from the Old Red Sandstone of Rowlestone quarry, Herefordshire.

In Trans. Woolhope Nat. Field Club, 1870, p. 266, 3 pls.

—— On *Necrogrammarus salweyi*, lower Ludlow, Leintwardine.

In Trans. Woolhope Nat. Field Club, 1870, p. 271.

—— On *Eurypterus brodiei*, from Perton, Hereforshire.

In Trans. Woolhope Field Club, 1870, p. 276, 2 pls.

—— Notes on fossil Crustacea.

In Rept. 40th Meeting Brit. Assoc. Adv. Sci., 1870, Trans. of sec., p. 91.

Eurypterus, *Ceratiocaris*, *Cyclus*, *Dithyrocaris*.

—— Contributions to British fossil Crustacea.

In Geol. Mag., vol. 7, London, 1870, p. 554, pl. 22.

Cyclus.

—— On the structure of Trilobites.

In Geol. Mag., vol. 8, London, 1871, p. 289, pl. 8.

Asaphus platycephalus Stokes.

—— On some new Phyllopodous Crustaceans from the Palæozoic rocks.

In Geol. Mag., vol. 8, 1871, p. 104, pl. 3.

Ceratiocaris, *Dithyrocaris*.

Extract published in the Canadian Naturalist, n. s., vol. 6, 1871, p. 18.

—— Fifth report on the structure and classification of the fossil Crustacea, etc.

In Rept. 41st Meeting Brit. Assoc. Adv. Sci., 1871, p. 53; also, Geol. Mag., vol. 8, London, 1871, p. 521.

—— On a new species of *Eurypterus* (*E. brodici*) from Perton, near Stoke Edith, Herefordshire.

In Quart. Jour. Geol. Soc. London, vol. 27, 1871, p. 261, figures.

—— On a new fossil Crustacean, from the Devonian of Canada.

In Canadian Naturalist, n. s., vol. 6, 1871, p. 18.

Dithyrocaris.

—— Note on some British Palæozoic Crustacea belonging to the order Merostomata.

In Geol. Mag., vol. 9, London, 1872, p. 433, pl. 10.

Hemiaspis, *Pseudoniscus*, *Exapinurus*, *Bunodes*, *Bellinurus*, *Prestwichia*.

—— Further remarks on the relationship of the Xiphosura to the Eurypteridæ, and to the Trilobita, etc.

In Quart. Jour. Geol. Soc. London, vol. 28, 1872, p. 46, figures; also, Annals Mag. Nat. Hist. London, 4th series, vol. 9, London, 1872, p. 406.

—— Sixth report on the structure and classification of the fossil Crustacea, etc.

In Rept. 42d Meeting Brit. Assoc. Adv. Sci., 1872, p. 321; also, Geol. Mag., vol. 9, London, 1872, p. 563.

—— Life forms of the past and present.

In Popular Sci. Review, vol. 11, London, 1873, p. 391, pls. 90, 91.

Pterygotus, *Slimonia*, *Stylonurus*, *Eurypterus*, *Hemiaspis*, *Prestwichia*, *Bellinurus*, *Neolimulus*, *Dithyrocaris*, *Trinucleus ornatus*, *Sao hirsuta*.

—— On a new Trilobite from the Cape of Good Hope.

In Quart. Jour. Geol. Soc. London, vol. 29, 1873, p. 32, pl. 2.

Encrinurus crista-galli.

—— Seventh report of the committee appointed for the purpose of continuing researches in fossil Crustacea, consisting of Prof. P. Martin Duncan, Henry Woodward, and Robert Etheridge.

In Rept. 43d Meeting Brit. Assoc. Adv. Sci., 1873, p. 304; also, Geol. Mag., vol. 10, London, 1873, p. 520.

Olenus utahensis n. s.

—— and **Etheridge**, jr. (Robert). On some specimens of *Dithyrocaris*, from the Carboniferous limestone series, East Kilbride, and the Old Red Sandstone of Lanarkshire.

In Geol. Mag., vol. 10, London, 1873, p. 482, pl. 16.

—— —— On some specimens of *Dithyrocaris*, from the Carboniferous limestone series, East Kilbride, and from the old red sandstone of Lanarkshire.

In Rept. Brit. Asso., vol. 43, 1873, Trans. of sec., p. 92.

—— Eighth report on fossil Crustacea.

In Rept. 45th Meeting Brit. Assoc. Adv. Sci., 1875; also, Geol. Mag., new series, decade 2, vol. 2, 1875, p. 620.

—— Two lectures on recent and fossil Crustacea delivered at the Royal Institution, on April 29 and May 6, 1876.

In Proc. Royal Inst. Gr. Brit., 1876; Times, Morning Post, Illustrated News, 1876.

Woodward (Henry)—Continued.

—— A catalogue of British fossil Crustacea, with their synonyms and the range in time of each genus and order. Published by order of the trustees of the British Museum 1877.

A review of the book was published in the Geol. Mag., decade 2, vol. 4, 1877.

—— Note on the genus *Anthrapalæmon* (*Palæocarabus*) of Salter from the Coal Measures.

In Geol. Mag., decade 2, vol. 4, 1877, p. 55.

—— Article "Crustacea."

In Ency. Britannica, vol. 6, 1877, 86 wood-cuts.

Asaphus, *Trinucleus*, *Sao*, *Acidaspis*, *Paradoxides*.

—— Discovery of the remains of a fossil crab (*Decapoda-Brachyura*) in the Coal Measures of the environs of Mons, Belgium.

In Geol. Mag., decade 2, vol. 5, London, 1878, p. 433, pl. 11.

Brachypyge carbonis Wood.

—— Note on Palæozoic Crustacea.

In Geol. Mag., decade 2, vol. 6, 1879, p. 196, pl. 5.

Eurypterus scouleri.

—— A new genus of Trilobites *Onycopyge liversidgei*, from South Wales.

In Geol. Mag., decade 2, vol. 7, 1880, p. 97, figure.

—— Note on a new English *Homalonotus* from the Devonian, Torquay, South Devon.

In Geol. Mag., decade 2, vol. 8, London, 1881, p. 489, pl. 13.

Homalonotus champernowni

—— Contributions to the study of fossil Crustacea.

In Geol. Mag., decade 2, vol. 8, London, 1881, p. 529, pl. 14.

Eryon perroni, *Palæocaris burnettii*, figure, p. 533, pl. 14, fig. 3.

—— Additional note on *Homalonotus* from the Devonian.

In Geol. Mag., decade 2, vol. 9, London, 1882, p. 157, pl. 4.

Homalonotus goniopygœus, *H. champernowni*.

—— Note on *Ellipsocaris dewalquei*, a new Phyllopod from the Upper Devonian of Belgium.

In Geol. Mag., decade 2, vol. 9, London, 1882, p. 444, figures.

—— On a series of Phyllopod Crustacean shields from the Upper Devonian of the Eifel; and on one from the Wenlock shales of Wales.

In Geol. Mag., new series, decade 2, vol. 9, London, 1882, p. 385, pl. 9.

Cardiocaris n. g., *Pholadocaris* n. g., *Aptychopis*.

—— Synopsis of the genera and species of Carboniferous limestone Trilobites.

In Geol. Mag., new series, decade 2, vol. 10, London, 1883, pp. 445, 481, 534, pls. 11–13.

Phillipsia, *Griffithides*, *Brachymetopus*.

Edition by author 3 pls. and 26 pp.

—— Synonyms of *Phillipsia gemmulifera*.

In Geol. Mag., decade 3, vol. 1, London, 1884, p. 22.

—— Monograph of the British Carboniferous Trilobites.

In Palæont. Soc. London, pt. 1, 1883, pp. 1–38, pls. 1–6. *Phillipsia*, *Griffithides*. Pt. 2 (conclusion), 1884, pp. 39–83, pls. 7–10.

Proetus, *Phillipsia*, *Brachymetopus*, *Griffithides*, *Dalmanites?*

—— On the structure of Trilobites.

In Geol. Mag., decade 3, vol. 1, London, 1884, p. 78.

Asaphus.

—— Appendages of Trilobites.

In Geol. Mag., decade 3, vol. 1, London, 1884, p. 162.

Asaphus megistos, 2 figs.; *Calymene*.

—— Note on the remains of Trilobites from South Australia.

In Geol. Mag., decade 3, vol. 1, London, 1884, p. 342.

Conocephalites, *Dolichometopus*.

—— Synopsis of the genera and species of Carboniferous limestone Trilobites.

In Geol. Mag., decade 3, vol. 1, London, 1884, p. 484, pl. 16.

Phillipsia laticaudata, *P. scabra*, *P. carinata*, *Griffithides brevispinus*, *G. glaber*, *G.? carringtonensis*.

—— On the discovery of Trilobites in the Culm shales of southeast Devonshire.

In Geol. Mag., decade 3, vol. 1, 1884, p. 534.

Phillipsia lei, *P. minor*, *P. cliffordi*, *P. articulosa*.

—— and **Jones** (T. Rupert). Notes on the phyllodiform Crustacea, referable to the genus *Edinocaris*, from the Palæozoic rocks.

In Geol. Mag., decade 3, vol. 1, London, 1884, p. 393, pl. 13.

Ceratiocaris.

—— On some Palæozoic Phyllopod shields and on Nebalia and its allies.

In Geol. Mag., decade 3, vol. 2, London, 1885, p. 345, pl. 9.

Woodward (Henry)—Continued.

—— Notice of a new limuloid Crustacean from the Devonian, by H. S. Williams.

In Geol. Mag., decade 3, vol. 2, London, 1885, p. 427.

—— On the discovery of Trilobites in the Upper Green (Cambrian) slates of the Penrhyn quarries, Bethesda, near Bangor, North Wales.

In Quart. Jour. Geol. Soc. London, vol. 44, 1888, p. 74, pl. 6.

Conocoryphe viola Wood.

—— On the discovery of Trilobites in the Upper Green (Cambrian) slates, etc., North Wales.

In Rept. 57th Meeting Brit. Assoc. Adv. Sci., 1887, p. 696.

Conocoryphe viola.

—— On a new species of *Eurypterus* from the Lower Carboniferous shale, Eskdale, Scotland.

In Rept. 57th Meeting Brit. Assoc. Adv. Sci., 1887, p. 696.

—— See **Jones** (T. Rupert) and **Woodward** (Henry).

—— See **Etheridge** (Robert) and **Woodward** (Henry).

Worthen (A. H.) Description of two new species of Crustacea, fifty-one species of mollusca, and three species of Crinoids from the Carboniferous formation of Illinois and adjacent States.

In Bull. No. 2 State Mus. Nat. Hist. Illinois, 1884.

Colpocaris chesterensis, *Solenocaris St. Ludovici.*

See also **Meek** (F. B.) and **Worthen** (A. H.)

Young (J.) Descriptive notes of several new and rare forms of Entomostraca.

In Trans. Geol. Soc. Glasgow, vol. 5, pt. 2, 1877.

—— On the Silurian strata of Penwhapple Glen, near Girvan.

In Proc. Nat. Hist. Soc. Glasgow, vol. 1, pt. 2, 1868, p. 171; also in Proc. Royal Phys. Soc. Edinburgh, vol. 4, 1878.

Solenocaris n. g. (not *Solenocaris* Meek.).

Zenker (J. C.) Beiträge zur Naturgeschichte der Urwelt. Organische Reste (Petrefacten) aus der Altenburger Braunkohlen-Formation, dem Blankenburger Quadersandstein, jenaischen bunten Sandstein und böhmischen Uebergangsgebirge, mit 6 illuminirten Kupfertafeln. Jena, 1833.

Olenus longicaudatus, *O. pyramidalis*, *O. latus*, *Otarion* n. g., *O. diffractum*, *O.? squarrosum*, *Conocephalus* n. g., *C. costatus*, *Ellipsocephalus* n. g., *E. ambiguus.*

The genus *Otarion* was made up from the head of *Cyphaspis burmeisteri* Barr., connected with the pygidium of *Cromus beamonti* Barr. The second species, described as *Otarion? squarrosum*, is referred by Joachim Barrande to *Cheirurus quenstadi.*

J. C. Zenker uses two generic names for his new genus *Conocephalus*, the first on p. 48 in describing the genus and the second in his description of plate 5, where he calls it *Trigonocephalus.*

Both these generic terms had been used in natural history for other genera, the first by Thurnburg in 1812 for a genus of the Orthoptera, and the second by Oppel in 1811 for the Reptiles.

The typical species described as *Conocephalus costatus* on p. 49, and also in the explanation of pl. 5, figs. G–K, p. 51, and as *Trigonocephalus costatus* in the description of pl. 5, given on p. 51, has been referred by Joachim Barrande to an amended genus, *Conocephalites* (Zenker) Barr., and the species to the older name of *sulzeri.* The other new genus, *Ellipsocephalus*, has been used by all subsequent authors.

Zeno (Franz). Von Seeversteinerungen und Fossilien, welche bei Prag zu finden sind.

In Neue phys. Belustigungen, etc., vol. 1, 1770, p. 65. Continued same vol., p. 362, pl. 1, fig. 1.

Under the names of *Cacada* or *Käfermuschel* Franz Zeno describes the pygidium of *Dalmanites hausmanni* and the head of *Phacops latifrons.*

Zittel (Karl A.) Handbuch der Palæontologie. Vol. 2. München und Leipzig, 1881–'85, p. 525.

Zippe (F. X.) See **Sternberg** (Kasper *Graf* von).

PART II.

CATALOGUE OF TRILOBITES.

PART II.

A SYSTEMATIC CATALOGUE OF AMERICAN PALEOZOIC CRUSTACEA. TRILOBITA.

First series, with grooved pleuræ.

Family.	Genera.	Reference.
Harpedidæ	Harpes Goldfuss, 1839	Nova Acta Physico-Med., vol. 19, p. 358. Type, *Harpes macrocephalus* Gold., *Harpes ungula* Sternb. Barrande, Syst. Sil. Bohême, vol. 1, p. 347, pls. 3–9.
Remopleuridæ.	Remopleurides Portlock, 1843.....	Geol. Rept. Londonderry, etc., p. 254. Type, *Remopleurides colbii* Portlock.
Paradoxidæ....	Paradoxides Brongniart, 1822.....	Hist. Crust. Foss., p. 30. Type, *Paradoxides tessini* Brong.
	Anopolenus Salter, 1864	Geol. Soc. London Jour., vol. 20, p. 236. Type, *Anopolenus henrici* Salter.
	Bathynotus Hall, 1860	Thirteenth Rept. New York State Cab. Nat. Hist., p. 117. Type, *Bathynotus holopyga* Hall.
	Dicellocephalus Owen, 1852.......	Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 573. Type, *Dikelocephalus minnesotensis* Owen.
	Mesonacis Walcott, 1884..........	Am. Jour. Sci., 3d series, vol. 29, p. 329. Type, *Olenus vermontana* Hall.
	Dolichometopus Angelin, 1854....	Palæont. Scand., p. 72. Type, *Dolichometopus svecicus;* Ang. Palæont. Scand., p. 73, pl. 37, fig. 9.
	Hydrocephalus Barrande, 1846....	Notice Prélim. Syst. Sil. Bohême, p. 18. Type, *Hydrocephalus carens* Barr. Notice Prélim. Syst. Sil. Bohême, p. 19.
	Olenellus Hall, 1861	Fifteenth Rept. New York State Cab. Nat. Hist., p. 114. Type, *Olenellus thompsoni* Hall. Twelfth Rept. New York State Cab. Nat. Hist., p. 59, figure.
	Olenus Dalman, 1826..............	Palæad., p. 56. Type, *Olenus gibbosus* Wahlenburg.
	Zacanthoides Walcott, 1887.......	Am. Jour. Sci., 3d series, vol. 36, p. 165. Type, *Olenoides spinosus* Walcott.
	Parabolina Salter, 1849............	Mem. Geol. Survey United Kingdom, decade 2. Type, *Olenus spinulosa* Wahl.
	Peltura Milne-Edwards, 1840.	Hist. Nat. Crust., vol. 3, p. 344. Type, *Olenus scarabæoides* Wahl.
	Cyclognathus Linnarsson, 1875 ...	Geol. Föreningens Stockholm Förhandl., vol. 2, No. 12, p. 500. Type, *Cyclognathus micropygus* Linnarsson.

First series, with grooved pleuræ—Continued.

Family.	Genera.	Reference.
Paradoxides ...	Triarthrus Green, 1832............	Mon. Trilobites North America, p. 87. Type, *Triarthrus beckii* Green.
	Leptoplastus Angelin, 1854.......	Palæont. Scand., p. 46. Type, *Leptoplastus stenotus* Angelin.
	Subgenera:	
	1. Sphærophthalmus Angelin, 1854.	Palæont. Scand., p. 49. Type, *Sphærophthalmus flagellifer* Ang.
	2. Ctenopyge Linnarsson, 1880.	Geol. Föreningens Stockholm Förhandl., vol. 5, p. 145. Type, *Olenus* (*Sphærophthalmus*) *pecten* Salter.
	Bœckia Brögger, 1882.............	Die silurischen Etagen 2 und 3, p. 122. Type, *Bœckia hirsuta* Brögger.
	Ceratopyge Corda, 1847...........	Prodr., p. 161. Type, *Olenus forficular* Sars.
Bohemillidæ...	Bohemilla Barrande, 1872..........	Syst. Sil. Bohême, vol. 1, Suppl., p. 137. Type, *Bohemilla stupenda* Barr.
Conocoryphidæ	Atops Emmons, 1844...............	Taconic System, p. 20. Type, *Atops trilineatus* Emmons.
	Conocoryphe Corda, 1847..........	Prodr., p. 23. Type, *Trilobite sulzeri* Schlott.
	Ptychoparia Corda, 1847...........	Prodr., p. 26. Type, *Conocephalus striatus*.
	Ctenocephalus Corda, 1847........	Prodr., p. 26. Type, *Ctenocephalus barrandi* Corda.
	Solenopleura Angelin, 1854.......	Palæont. Scand., p. 26. Type, *Solenopleura holometopa* Ang.
	Liostracus Angelin, 1854..........	Palæont. Scand., p. 27. Type, *Liostracus aculeatus* Angelin.
	Aneuacanthus Angelin, 1854.......	Palæont. Scand., p. 5. Type, *Aneuacanthus acutangulus* Ang.
	Anomocare Angelin, 1854.........	Palæont. Scand., p. 24. Type, *Anomocare aculeatus* Angelin.
	Angelina Salter, 1847.............	Mem. Geol. Survey United Kingdom, decade xi. Type *Angelina sedgwicki* Salter.
	Agraulos Corda, 1847.............	Prodr., p. 26. *Agraulus certicephalus* Barr.
	Dorypyge Dames, 1884............	China (Richthofen), vol. 4, p. 23.
	Bathyurus Billings, 1859..........	Canadian Naturalist, vol. 4. p. 364. Type, *Asaphus extans* Hall.
	Bathyurella Billings, 1865........	Pal. Foss., vol. 1, p. 262. *B. marginatus*, *B. nitidus*, *B. expansus* Billings.
	Chariocephalus Hall, 1863........	Sixteenth Rept. New York State Cab. Nat. Hist., p. 175. Type, *Chariocephalus whitfieldi* Hall.
	Corynexochus Angelin, 1854......	Palæont. Scand., p. 59. Type, *Corynexochus spinulosa* Ang.
	Ellipsocephalus Zenker, 1833.....	Beiträge Nat. Urwelt, p. 31. Type, *Ellipsocephalus ambiguus* Zenker=*Ellipsocephalus hoffi* Schlott.
	Ptychaspis Hall, 1863.............	Sixteenth Rept. New York State Cab. Nat. Hist., p. 170. Type, *Dikelocephalus miniscœnsis* Owen.
	Sao Barrande, 1846................	Notice Prélim. Syst. Sil. Bohême, p. 13. Type, *Sao hirsuta* Barr.

First series, with grooved pleuræ—Continued.

Family.	Genera.	Reference.
Proetidæ	**Proetus Steininger, 1831**	Mém. Soc. Géol. France, vol. 1, p. 355. Type, *Proetus cuvieri* Steininger.
	Dechenella Kayser, 1880	Zeitschr. Deutsch. geol. Gesell., Berlin, vol. 32, p. 703. Type, *Dechenella verneuili* Barr.
	Prionopeltis Corda, 1847 (*Phæton* Barr., *Phæthonides* Angelin).	Prodr., p. 121. Type, *Prionopeltes polydorus* Corda.
	Brachymetopus McCoy, 1847	Annals Mag. Nat. Hist., 1st series, London, vol. 20, p. 229. Type, *Phillipsia maccoyi* Portlock.
	Cyphaspis Burmeister, 1843	Org. Trilobiten (Ray Soc. Ed., p. 98). *Phacops certophthalma* Gold.
	Arethusina Barrande, 1852	Syst. Sil. Bohême, vol. 1, p. 494. *Arethusina konincki* Barr.
	Harpides Beyrich, 1846	Untersuch. Trilobiten, p. 34. Type, *Harpides hospes* Beyrich.
	Carmon Barrande, 1872	Syst. Sil. Bohême, vol. 1, suppl., p. 19. Type, *Carmon multilus* Barr.
	Cyphoniscus Salter, 1852	Rept. 22d Meeting Brit. Assoc. Adv. Sci., Trans. Sec., p. 95. Type, *Cyphoniscus socialis* Salter.
Phillipsidæ	**Phillipsinella Novák, 1885**	Sitzungsbe. rböhm. Gesell. Wiss., 1885. Author's edition, p. 4. Type, *Phillipsinella parabola* Barr.
	Phillipsia Portlock, 1843	Geol. Rept. Londonderry, etc., p. 305. Type, *Phillipsia kelli* Portlock=*Asaphus gemmulifera* Phillips.
	Griffithides Portlock, 1843	Geol. Rept. Londonderry, etc., p. 310. Type, *Griffithides longiceps* Portlock.
Dalmanitidæ ..	**Phacops Emmrich, 1839**	De Trilob., etc., p. 18. Type, *Phacops latifrons* Bronn.
	Dalmanites Emmrich, 1844	Zur Nat. Trilobiten, etc., p. 15. Barrande's Syst. Sil. Bohême, vol. suppl., p. 27. Type, *Dalmanites caudata* Brünnich.
	Coronura Hall & Clarke, 1888	Pal. New York, vol. 7, p. xxxii. Type, *Coronura aspectens* Conrad.
	Cryphæus Green, 1837	Am. Jour. Sci., 1st series, vol. 32, p. 343. Type, *Cryphæus boothi* Green.
	Chasmops McCoy, 1849	Annals Nat. Hist., 2d series, vol. 4; also Contrib. to Palæont., p. 143. Type, *Calymene odini* Eichwald.
Calymenidæ ...	**Calymene Brongniart, 1822**	Crust. Foss., p. 11. Type, *Calymene tuberculata* Brünnich.
	Homalonotus Koenig, 1825	Icones Foss. Sectiles, p. 7. Type, *Homalonotus knighti* Koenig.
	Bavarilla Barrande, 1868	Faune Sil. des environs de Hof en Bavière, p. 75. Type, *Bavarilla hofensis* Barr.
Lichasidæ	**Lichas Dalman, 1826**	Palæad., p. 53. Type, *Lichas laciniatus* Wahl.

First series, with grooved pleuræ—Continued.

Family.	Genera.	Reference.
Trinucleidæ ..	Trinucleus Lhlwyd, 1698 (Cryptolithus Green, 1832).	Murchison's Silurian Syst., 1839, p. 659. Type, *Trinucleus fimbriatus.*
	Ampyx Dalman, 1826.	Palæad., p. 53. Type, *Ampyx nasuta* Dalman.
	Dionidæ Barrande, 1847...........	Neues Jahrb. für Mineral., 1847, pt. 4, p. 391; Syst. Sil. Bohême, vol. 1, p. 540. Type, *Dionidæ formosa* Barr.
	Subgenera:	
	1. *Salteria* Thomson, 1864......	Mem. Geol. Survey United Kingdom, decade xi, pl. 7, p. 1. Type, *Salteria primæva* Thomson.
	2. *Endymima* Billings, 1862...	Pal. Foss., vol. 1, p. 93. Type, *Endyminia meeki* Billings.
Æglinidæ......	Æglina Barrande, 1852............	Syst. Sil. Bohême, vol. 1, p. 663. Type, *Æglina rediviva* Barr.
Illænuridæ	Illænurus Hall, 1863	Sixteenth Rept. New York State Cab. Nat. Hist., p. 176. Type, *Illænurus quadratus* Hall.
Asaphidæ	Asaphus Brongniart, 1822	Crust. Foss., p. 17. Type, *Asaphus expansus* Wahl.
	Ptychopyge Angelin, 1854	Palæont. Scand., p. 51. Type, *Ptychopyge appanata* Ang.
	Brachyaspis Salter, 1866	Mon. Brit. Trilobites, p. 167. Type, *Asaphus rectifrons* Portlock and *Asaphus lævigatus* Angelin.
	Megalaspis Angelin, 1852.........	Palæont. Scand., p. 15. Type, *Megalaspis gigas* Angelin.
	Ogygia Brongniart, 1822	Crust. Foss., p. 26. Type, *Asaphus buchi* Brong.
	Barrandia McCoy, 1849	Annals Nat. Hist., 2d series, vol. 4, p. 409. Type, *Barrandia cordai* McCoy.
	Niobe Angelin, 1852	Palæont. Scand., p. 13. Type, *Asaphus frontalis* Dalman.
	Asaphellus Callaway, 1877........	Quart. Jour. Geol. Soc. London, vol. 33, p. 663. Type, *Asaphellus homfrayi* Salter.
	Nileus Dalman, 1826	Palæad., p. 49. Type, *Nileus armadillo* Dalman.

Second series, with plane pleuræ.

Styginidæ	Stygina Salter, 1853	Rept. 22d Meeting Brit. Assoc. Adv. Sci., p. 59. Type, *Stygina latifrons* Portlock.
Illænidæ.......	Illænus Dalman, 1826	Palæad., p. 51. Type, *Illænus crassicauda* Wahl.; Nova Acta Reg. Soc. Sci. Upsal., vol. 8, p. 27, pl. 2, figs. 3, 5, 6. (Not. pl. 7, figs. 5, 6 = *Illænus esmarki.*)
	Dysplanus Burmeister, 1843.......	Organization Trilobites, p. 105 (Ray Soc. Ed. 1846). Type, *Dysplanus centrotus* Dalm.
	Bumastus Murchison, 1839........	Sil. Syst, p. 656. Type, *Bumastus barriensis* Murch.
	Panderia Volborth, 1863	Mém. Acad. Sci. St.-Pétersbourg, 7th series, vol. 6, No. 2, p. 31. Type, *Panderia triquetra* Volb.

Third series, with ridged pleuræ (*pleure à bourrelet*, Barrande).

Family.	Genera.	Reference.
Acidaspidæ	**Acidaspis Murchison, 1839** (*Odontopleura* **Emmrich, 1839**).	Silurian System, p. 558. Type, *Acidaspis brightii* Murch.
Ceranridæ	**Ceraurus Green, 1832** (*Cheirurus* **Beyrich, 1845**).	Mon. Trilobites N. A., p. 83. Type, *Ceraurus pleurexanthemus* Green.
	Sphærexochus Beyrich, 1845	Ueber einige böhm. Trilobiten, p. 19. Type, *Sphærexochus mirus* Beyrich.
	Areia Barrande, 1872	Syst. Sil. Bohême, vol. 1, suppl., p. 96. Type, *Areia bohemica* Barr.
	Deiphon Barrande, 1852	Syst. Sil. Bohême, vol. 1, p. 814. Type, *Deiphon forbesi* Barr.
	Placoparia Corda, 1847	Prodr., p. 128. Type, *Placoparia zippi* Boeck.
	Staurocephalus Barrande, 1852	Syst. Sil. Bohême, vol. 1, p. 810. Type, *Staurocephalus murchisoni* Barr.
	Onycopyge Woodward, 1880	Geol. Mag., decade 2, vol. 7, p. 97. Type, *Onycopyge liversidgei* Woodward.
Amphionidæ	**Amphion Pander, 1850**	Beiträge Geog. Russischen Reiches, p. 439. Type, *Amphion fischeri* Eichwald.
	Cromus Barrande, 1852	Syst. Sil. Bohême, vol. 1, p. 821. Type, *Cromus intercostatus* Barr.
Encrinuridæ	**Encrinurus Emmrich, 1844 (Cryptonymus Eichwald).**	Zur Nat. Trilobiten, p. 16. Type, *Trilobus punctatus* Brünnich.
	Cybele Loven, 1845	Svenska Akad. Förhandl., 1845, p. 110. Type, *Calymene bellatula* Dalman.
	Dindymene Corda, 1847	Prodr., p. 119. Type, *Dindymene frederico-augusti* Corda.
Brontidæ	**Bronteus Goldfuss, 1843**	Beiträge Petrefact., Nova Acta Physico-Med., vol. 19, p. 360. Type, *Brontes flabellifer* Gold.

Fourth series.

Agnostidæ	**Agnostus Brongniart, 1822**	Hist. Crust. Foss., p. 38. Type, *Agnostus pisiformis*.
	Shumardia Billings, 1862	Pal. Foss., vol. 1, p. 92. Type, *Shumardia granulosa* Billings.
	Microdiscus Emmons, 1856	Am. Geology, vol. 1, pt. 2, p. 116. As defined by Chas. D. Walcott, 1886. Type, *M. punctatus* and *M. speciosus*.

A CATALOGUE OF NORTH AMERICAN SPECIES OF TRILOBITES.

[Current names are printed in bold face type; synonyms in *Italic*.]

Acantholoma Conrad, 1840; 3d Annual Rept. Pal. Dept. New York Geol. Survey, p. 205. (See **Acidaspis.**)

—— *spinosa* Conrad. (See **Acidaspis tuberculatus.**)

Acidaspis Murchison, Silurian System, 1839, p. 658.

Type, *Acidaspis brightii* Murch., Sil. Syst., p. 658, pl. 14, figs. 10, 15.

Syn., *Ceratocephala* Warder, 1838; Am. Jour. Sci., 1st series, vol. 34, p. 377.
Odontopleura Emmrich, 1839; De Tril., p. 53.
Arges Goldfuss (in part), Neues Jahrbuch für Mineral., 1843, pp. 544, 556.
Polyeris Rouault, 1846; Bull. Soc. Géol. France, vol. 4, p. 320.
Selenopeltis Corda, 1847; Prodr., p. 34.
Trapelocera Corda, 1847; Prodr., p. 158.
Discranurus Conrad, 1841; 5th Ann. Rept. Pal. Dept. New York Geol. Survey, p. 48.

—— **anchoralis** Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 349, figs. 2–4. Hudson.

—— *armatus*. (See **Acidaspis eriops.**)

—— **callicera** Hall, 1888; Pal. New York, vol. 7, pp. 69, 224, pl. 16 b, figs. 1–3. Upper Helderberg.

—— [*Ceratocephala*] **ceralepta** Anthony, 1838; Am. Jour. Sci., 1st series, vol. 34, p. 379, figs. 1, 2. Hudson.

—— **ceralepta** Meek, 1873; Pal. Ohio, vol. 1, p. 169, pl. 14, figs. 8–9.

—— **ceralepta** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 130.

—— **cincinnatiensis** Meek, 1873; Pal. Ohio, vol. 1, p. 167, pl. 14, fig. 3. Hudson.

—— **cincinnatiensis** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 130.

—— [*Ceraurus*] **crosotus** Locke, 1842; Am. Jour. Sci., 1st series, vol. 44, p. 347, fig. Hudson.

—— **crosotus** James, 1871; Catalogue Fossils Cincinnati Group, p. 14.

—— **crosotus** Meek, 1873; Pal. Ohio, vol. 1, p. 165, pl. 14, figs. 10 a, b.

—— **crosotus** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 129.

—— **danai** Hall, 1862; Geol. Wisconsin, vol. 1, p. 432. Niagara.

Syn., *Acidaspis ida* (Winchell and Marcy) Hall, 20th Rept. New York State Cab. Nat. Hist., p. 389.

—— **danai** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 333, pl. 21, figs. 8, 9.

—— **danai** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 423, pl. 21, figs. 8, 9 (rev. ed.).

—— [*Terataspis*] **eriops** Hall, 1876; Illus. Devonian Foss. Crust., pl. 19, figs. 4–7, 10, 11, 12. (See **Lichas** (*Conolichas*) **eriops** Hall.)

—— **fimbriata** Hall, 1879; Description of New Species from the Niagara Group, p. 20. Niagara.

—— **fimbriata** Hall, 1882; Trans. Albany Inst., vol. 10, p. 76.

Acidaspis fimbriata Hall, 1883; 11th Rept. Geol. Nat. Hist. Indiana, p. 334, pl. 33, fig. 11.

—— [*Terataspis*] **grandis** Hall, 1876; Illus. Devonian Foss. Crust., pl. 17, figs. 1–8; pl. 18, figs. 1–4. (See **Lichas** (*Terataspis*) **grandis** Hall.)

—— **halli** Shumard, 1855; 1st and 2d Rept. Geol. Survey Missouri, pt. 2, p. 200, pl. B, figs. 7 a, b, c. Trenton.

—— [*Discranurus*] **hamata** Conrad, 1841; 5th Ann. Rept. Pal. Dept. New York Geol. Survey, p. 48, pl. 1, fig. 1. Lower Helderberg.

—— [*Discranurus*] **hamata** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., pl. 2, fig. 1. Republication of pl. 2, 5th Ann. Rept. Pal. Dept. New York Geol. Survey.

—— **hamata** Hall, 1859; Pal. New York, vol. 3, p. 371, pl. 79, figs. 15–19.

—— **hamata** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 390, pl. 7, fig. 17.

—— **horani** Billings, 1857; Geol. Survey Canada, p. 341. Trenton.

—— **horani** Billings, 1863; Geol. Survey Canada, p. 190, fig. 190.

—— *ida* Winchell and Marcy, 1865; Mem. Boston Soc. Nat. Hist., vol. 1, p. 106, pl. 3, fig. 13.

—— **o'nealli** Miller, 1875; Cincinnati Quart. Jour., vol. 2, p. 86, fig. 9. Hudson.

—— **ortoni** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 90, pl. 8, fig. 1.

—— **parvula** Walcott, 1877; Advanced sheets 31st Rept. New York State Mus., p. 16. Trenton.

—— **parvula** Walcott, 1879; 31st Rept. New York State Mus., p. 69.

—— **romingeri** Hall, 1888; Pal. New York, vol. 7, pp. 71, 224, pl. 16 b, figs. 15–18. Hamilton.

—— *spiniger*. (See **Bathyurus spiniger**.)

—— **trentonensis** Hall, 1847; Pal. New York, vol. 1, p. 240, pl. 64, figs. 4 af. Trenton.

—— **trentonensis** Emmons, 1855; American Geology, vol. 1, pt. 2, p. 216, fig. 73.

—— **tuberculatus** Conrad, 1840; 3d Ann. Rept. Pal. Dept. New York Geol. Survey, p. 205. Lower Helderberg.

Syn., *Acantholoma* Conrad, 1840; 3d Ann. Rept. Pal. Dept. New York Geol. Survey, p. 205, fig. 3.

Acantholoma spinosa Conrad, 4th Ann. Rept. Pal. Dept. New York Geol. Survey, p. 39, pl. 1, fig 3.

—— **tuberculatus** Hall, 1859; Pal. New York, vol. 3, p. 368, pl. 79, figs. 1–14.

—— **tuberculatus** Hall, 1861; 15th Rept. New York State Cab. Nat. Hist., pl. 2, fig. 3.

Actinurus De Castelnau, 1843; Sil. Syst. de l'Amér., p. 21. (See **Lichas boltoni**.)

Aglaspis Hall, 1862; Canadian Naturalist, vol. 7, p. 445, figure. Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 181.

Type, *Aglaspis barrandi* Hall.

—— **barrandi** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 181, pl. 11, figs. 7–16. Potsdam.

—— **eatoni** Whitfield, 1880; Ann. Rept. Geol. Survey Wisconsin, p. 52. Potsdam.

—— **eatoni** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 192, pl. 10, fig. 11.

Agnostus Brongniart, 1822; Hist. Nat. Crust. Foss., p. 38.

Type, *Agnostus pisiformis*, idem., p. 38, pl. 4, figs. 4 a, 4 b.

Syn., *Battus* Dalman, 1826; Palæad., p. 33.

Trinodus McCoy, 1846; Sil. Foss. Ireland, p. 56.

Phalacroma Corda (in part), 1847; Prodr., p. 158.

Mesospheniscus Corda, 1847; Prodr., p. 46 (*Agnostus integer*).

Diplorrhina Corda, 1847; Prodr., p. 46.

Condylòpyge Corda, 1847; Prodr., p. 50 (*Agnostus rex*).

Lejopyge Corda, 1847; Prodr., p. 51 (*Agnostus lævigatus*).

Arthrorhachis Corda, 1847; Prodr., p. 114 (*Agnostus tardus*).

Peronopsis Corda, 1847; Prodr., p. 115 (*Agnostus interger*).

Pleuroctenium Corda, 1847; Prodr., p. 116 (*Agnostus granulatus*).

Agnostus acadicus Hartt, 1868; Acadian Geology, p. 655, fig. 229 (3d ed.). St. John.
Syn., *Similis* Hartt, 1868; Acadian Geology, p. 656 (3d ed.).
Similis Hartt (Walcott), 1884; Bull. U. S. Geol. Survey, No. 10, p. 22.

—— **acadicus** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 22, pl. 2, figs. 2, 2 a, c.

—— **americanus** Billings, 1860; Canadian Naturalist, vol. 5, p. 302, fig. 1. Quebec.

—— **americanus** Billings, 1865; Pal. Foss., vol. 1, p. 395, fig. 372.

—— **bidens** Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, p. 463. Potsdam.

—— **bidens** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 26, pl. 9, figs. 13, 13 a.

—— **canadensis** Billings, 1860; Canadian Naturalist, vol. 5, p. 304, fig. 3. Quebec.

—— **canadensis** Billings, 1865; Pal. Foss., vol. 1, p. 397, fig. 374.

—— **coloradoensis** Shumard, 1861; Am. Jour. Sci., 2d series, vol. 32, p. 218. Potsdam.

—— **communis** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 228, pl. 1, figs. 28, 29. Potsdam.

—— **communis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 27.

—— **disparilis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 179, pl. 10, figs. 25–27. Potsdam.

—— **fabius** Billings, 1865; Pal. Foss., vol. 1, p. 298, fig. 289. Quebec.

—— **glabba** Billings, 1865; Pal. Foss., vol. 1, p. 297, fig. 288. Quebec.

—— **interstrictus** White, 1874; Prelim. Rept. Invert. Foss., p. 7. Potsdam.

—— **interstrictus** White, 1877; U. S. Geog. and Geol. Survey W. 100th Meridian, p. 38, pl. 2, figs. 5 a, 5 b.

—— **interstrictus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 149, pl. 16, figs. 6, 6 a.

—— **interstrictus** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 166.

—— sp.? Rominger, 1887; Proc. Acad. Nat. Sci. Phila., p. 18.

—— **josepha** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 178, pl. 6, figs. 54, 55. Potsdam.

—— *lobatus* Hall. (See **Microdiscus lobatus.**)

—— **maladensis** Meek, 1873; 6th Annual Rept. U. S. Geol. Survey Territories, p. 464. Calciferous.

—— **neon** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 229, pl. 1, figs. 26, 27. Potsdam.

—— **neon** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 27.

—— **nobilis** Ford, 1872; Am. Jour. Sci., 3d series, vol. 3, p. 421, figs. 1, 2. Postdam.

—— **nobilis** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 150, pl. 16, fig. 7.

—— **orion** Billings, 1860; Canadian Naturalist, vol. 5, p. 304, fig. 2. Quebec.

—— **orion** Billings, 1865; Pal. Foss., vol. 1, p. 397, fig. 393

—— **orion** Shumard, 1863; Trans. Acad. Sci. St. Louis, vol. 2, p. 105.

—— **parilis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 179, pl. 11, figs. 23, 24. Potsdam.

—— **prolongus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 230, pl. 1, figs. 30, 31. Potsdam.

—— **prolongus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 28.

—— **richmondensis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 24, pl. 9, fig. 10. Cambrian.

—— **seclurus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 25, pl. 9, fig. 14. Cambrian.

—— *similis* Hartt. (See **Agnostus acadicus.**)

—— **tumidosus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 231, pl. 1, fig. 32. Potsdam.

Agraulos Corda, 1847; Prodr., p. 23.

Type, *Arionellus certicephalus* Barrande.

Syn., *Arion* Barrande, 1846; Notice Prélim., p. 13.

Ellipsocephalus Barrande, 1846; Notice Prélim., p. 12 (not *Ellipsocephalus* Zenker) or (*Elliptocephalus* Emmons).

Arionellus Barrande, 1852; Syst. Sci. Bohême, p. 404.

—— **affinis** Billings, 1874; Pal. Foss., vol. 2, p. 72. Potsdam.

—— **affinis** Matthew, 1886; Trans. Royal Soc. Canada, vol. 2, p. 153, figs. 2, 2 a, b.

—— [*Arionellus*] **bipunctatus** Shumard, 1863; Trans. Acad. Sci. St. Louis, vol. 2, p. 101. Potsdam.

—— [*Arionellus*] **bipunctatus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 169, pl. 7, figs. 50–57.

—— [*Arionellus* (*Agraulos*)] **convexus** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 57. Potsdam.

—— [*Arionellus*] **convexus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 190, pl. 1, fig. 17.

—— [*Arionellus*] **cylindricus** Billings, 1860; Canadian Naturalist, vol. 5, p. 314, fig. 14. Quebec.

—— [*Arionellus*] **cylindricus** Billings, 1865; Pal. Foss., vol. 1, p. 406, fig. 385. (See **Ptychaspis cylindricus.**)

—— ? **globosus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 61, pl. 9, fig. 23. Cambrian.

—— **oweni** Meek and Hayden, 1861; Proc. Acad. Nat. Sci. Phila., 1861, p. 436. Potsdam.

The species was also referred to the genera *Arionellus* and *Crepicephalus*.

—— [*Arionellus*] **oweni** Meek and Hayden, 1862; Am. Jour. Sci., 2d series, vol. 33, p. 74.

—— [*Arionellus*] **oweni** Meek and Hayden; Pal. Upper Missouri, p. 9, figs. a, b, c, pl. 1, fig. 4.

Referred by Walcott, 1884, Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 55, pl. 10, to *Ptychoparia oweni*.

—— [*Arionellus* (*Bathyurus*)] **planus** Shumard, 1861; Am. Jour. Sci., 2d series, vol. 32, p. 219. Potsdam.

—— [*Arionellus*] **pustulatus** Walcott, 1877; Advanced sheets 31st Rept. New York State Mus. Nat. Hist., p. 15. Chazy.

—— [*Arionellus*] **pustulatus** Walcott, 1877; 31st Rept. New York State Mus. Nat. Hist., p. 68.

—— [*Arionellus*] **quadrangularis** Whitfield, 1884; Bull. Mus. Nat. Hist. New York, vol. 1, p. 147, pl. 14, fig. 8. Potsdam.

—— **quadrangularis** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 48, pl. 7, fig. 1.

—— **socialis** Billings, 1874; Pal. Foss., vol. 2, p. 71, fig. 40. Potsdam.

—— **socialis** Matthew, 1886; Trans. Royal Soc. Canada, vol. 2, p. 151, fig. 1, 1 a, b.

—— **strenuus** Billings, 1874; Pal. Foss., vol. 2, p. 71, fig. 41. Potsdam.

—— **strenuus** Matthew, 1886; Trans. Royal Soc. Canada, vol. 2, p. 153, figs. 3, 3 a, b.

—— *subclavatus* Billings. (See **Ptychaspis subclavatus.**)

—— [*Arionellus* (*Bathyurus*)] **texanus** Shumard, 1861; Am. Jour. Sci., 2d series, vol. 32, p. 218. Potsdam.

—— [*Arionellus*] **tripunctatus** Whitfield, 1876; Rept. Recon. Upper Missouri, p. 141, pl. 1, figs. 3–5. Potsdam.

—— [*Bathyurus?*] **woosteri** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 56. Potsdam.

—— [*Bathyurus?*] **woosteri** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 189, pl. 1, figs. 19–21.

Amphion Pander, 1830; Beiträge zur Geol. russischen Reiches, p. 139.

Type, *Amphion fischeri* Eichwald.

Amphion barrandi Billings, 1865; Pal. Foss., vol. 1, p. 288, fig. 277. Quebec.

—— **canadensis** Billings, 1859; Can. Nat., vol. 4, p. 381, fig. 12, a, b. Chazy.

—— **canadensis** Billings, 1863; Geol. Survey Canada, p. 133, fig. 69.

—— **canadensis** Billings, 1865; Pal. Foss., vol. 1, p. 288, fig. 278.

—— **convexus** Billings, 1865; Pal. Foss., vol. 1, p. 322. Quebec.

—— **insularis** Billings, 1865; Pal. Foss., vol. 1, p. 290. Quebec.

—— **julius** Billings, 1865; Pal. Foss., vol. 1, p. 290, fig. 279. Quebec.

—— **matutina** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 222, pl. 5 a, fig. 6. Potsdam.

—— *multisegmentatus*. (See **Encrinurus multisegmentatus**.)

—— **nevadensis** Walcott, 1884; Pal. Eureka Dist. Mon. U. S. Geol. Survey, vol. 8, p. 94, pl. 12, fig. 13. Pogonip.

—— **salteri** Billings, 1861; Canadian Naturalist, vol. 6, p. 322, fig. 6. Calciferous.

—— **salteri** Billings, 1865; Pal. Foss., vol. 1, p. 352, fig. 399.

—— **westoni** Billings, 1865; Pal. Foss., vol. 1, p. 321, fig. 307. Quebec.

Ampyx Dalman, 1826; Palæad., p. 53 (German edition).
Type, *Ampyx nasuta* Dalman.

—— **americanus** Safford and Vodges, 1889; Proc. Phila. Acad. Nat. Sci., p. 166, figure. Trenton.

—— **halli** Billings, 1861; Pal. Foss., vol. 1, p. 24, figs. 25, a, b, c. Chazy.

—— **halli** Billings, 1862; Geol. Survey Vermont, vol. 2, p. 959, fig. 365.

—— **læviusculus** Billings, 1865; Pal. Foss., vol. 1, p. 295, fig. 285. Quebec.

—— **normalis** Billings, 1865; Pal. Foss., vol. 1, p. 295, fig. 286. Quebec.

—— **rustilius** Billings, 1865; Pal. Foss., vol. 1, p. 296. Quebec.

—— **semicostatus** Billings, 1865; Pal. Foss., vol. 1, p. 297, fig. 287. Quebec.

Angelina Salter, 1864; Mem. Geol. Survey United Kingdom, decade xi, pl. 7.
Type, *Angelina sedgwicki* Salter.

—— **hitchcocki** Whitfield, 1884; Bull. Am. Mus. Nat. Hist., New York, vol. 1, p. 148, pl. 14, fig. 13. (See **Protypus hitchcocki**.) Potsdam.

Anomocare Angelin, 1852; Palæont. Scand., p. 24.
Type, *Anomocare aculeatus* Ang., pl. 18, fig. 6.

—— [*? Conoceph.*] **depressus** Shumard, 1861; Am. Jour. Sci., 2d series, vol. 32, p. 219. Potsdam.

—— [*Lonchocephus*] **hamulus** Owen, 1852; Geol. Survey Wisconsin, Iowa, and Minnesota, p. 576, pl. 1 a, figs. 8-12. Potsdam.

—— undet. Trilobite, Owen, 1848; Geol. Reconnoissance Chippewa Land Dist., p. 15, pl. 7, fig. 5.

—— [*Conocephalites*] **hamulus** Shumard, 1863; Acad. Sci. St. Louis, vol. 2, p. 104.

—— [*Conocephalites*] **hamulus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 166, pl. 7, figs. 43, 44; pl. 8, figs. 25, 26.

—— **hamulus** Dames, 1884; China (Richthofen), vol. 4, p. 24.

—— [*Conocephalites*] **patersoni** Hall, 1863; Rept. New York State Cab. Nat. Hist., p. 159, pl. 7, figs. 45, 46. Potsdam.

—— **patersoni** Dames, 1884; China (Richthofen), vol. 4, p. 24.

—— ? **parvum** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 59, pl. 9, fig. 17. Cambrian.

—— ? **parvum** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 209, pl. 25, fig. 1.

—— [*Crepicephalus ?*] **wisconsensis** Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, pl. 1, fig. 13. (The upper figure only; the other figured specimen belongs to *Dikelocephalus granulosus*.)

—— [*Crepicephalus*] **wisconsensis** Shumard, 1863; Trans. Acad. Sci. St. Louis, vol. 2, p. 103.

Anomocare [*Crepicephalus*] **wisconsensis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 164, pl. 7, figs. 39–41; pl. 8, figs. 22, 23, 24, 27, 28.

Syn., *Dikelocephalus latifrons* (Shumard) Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 165, pl. 7, fig. 40.

—— **wisconsensis** Dames, 1884; China (Richthofen), vol. 4, p. 24. Potsdam.

Anopolenus Salter, 1864; Geol. Mag., vol. 1, p. 236.

Type, *Anopolenus henrici* Salter; Quar. Jour. Geol. Soc. London, vol. 20, p. 236, pl. 13, figs. 4, 5. (See, also, **Anopolenus salteri** Hicks; same journal, vol. 21, p. 478, pl. , fig. 1.

—— **venustus** Billings, 1874; Pal. Foss., vol. 2, p. 73, fig. 42. Potsdam.

Arethusina Barrande, 1852; Syst. Sil. Bohême, vol. 1, p. 493.

Type, *Arethusina konincki* Barrande.

—— **americana** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 62, pl. 9, fig. 27. Cambrian.

Arges. (See **Lichas.**)

Arges, subgenus *Lichas*, Hall and Clarke, 1888; Pal. New York, vol. 7, p. lx.

—— *phlyctanodes* Green. (See **Lichas phlyctanodes.**)

—— *arionellus.* (See **Agraulos.**)

Asaphiscus Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, p. 485 (footnote).

—— [*Bathyurellus* (*Asaphiscus*)] **bradleyi** Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, p. 484. Cambrian.

—— **bradleyi** Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, p. 485.

—— **wheeleri** Meek, 1873; 6th Rept. U. S. Geol. Survey Territories, p. 485 (footnote). Cambrian.

—— **wheeleri** White, 1875; Geog. and Geol. Survey West 100th Meridian, vol. 4, p. 43, pl. 2, figs. 1 a–f.

—— **wheeleri** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 220, pl. 31, figs. 3, 3 a.

Asaphus Brongniart, 1822; Hist. Nat. Crust. Foss., p. 18, pl. 2, fig. 1 a, b.

Type, *Asaphus expansus* Linné.

Syn., *Cryptonymus*, Eichwald, 1825; (in part) not *Cryptonymus* Eichwald, 1840.
Isotelus De Kay, 1822; Annals Lyceum Nat. Hist. New York, vol. 1, p. 174.
Hemicrupturus Green, 1832; Mon. Tril. North America, p. 20.

—— *acantholeurus.* (See **Dalmanites acantholeurus.**)

—— **alacer** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 26, fig. 9.

—— *aspectans.* (See **Dalmanites aspectans.**)

—— **astragalotes** Green, 1834; Am. Jour. Sci., 1st series, vol. 25, p. 335.

—— **astragalotes** Green, 1835; Suppl. Mon. Tril. N. A., p. 11, cast 37.

Probably *Phacops rana* Green.

—— *barrandi.* (See **Ogygia barrandi.**)

—— **canadensis** Chapman, 1856; Canadian Jour., vol. 1, p. 482. Utica Slate.

—— **canadensis** Chapman, 1858; Canadian Jour., vol. 2, p. 47.

—— **canadensis** Chapman, 1858; Canadian Jour., vol. 3, p. 230, figure.

—— **canadensis** Chapman, 1859; Canadian Jour., vol. 4, p. 1, figure.

—— **canadensis** Chapman, 1859; Annals Nat. Hist., 3d series, vol. 2, p. 9, fig. 1.

—— **canadensis** Billings, 1863; Geol. Survey Canada, p. 204, fig. 201.

From a personal study of the species collected on the Georgian Bay, Canada, I am inclined to refer *Asaphus halli* and *A. hincksii* to *Asaphus canadensis* Chapman.

—— [*Isotelus*] **canalis** Conrad MSS. Chazy.

—— [*Isotelus*] **canalis** Hall, 1847; Pal. New York, vol. 1, p. 25, pl. 4 *bis*, figs. 17–19.

—— **canalis** Billings, 1865; Pal. Foss., vol. 1, p. 255; also p. 352, fig. 340 (not Conrad sp.).

—— **canalis** Billings, 1862; Geol. Vermont, vol. 1, p. 299, pl. 12, fig. 5.

This species is probably *Asaphus platycephalus.*

Asaphus canalis Whitfield, 1886; Bull. Am. Mus. Nat. Hist., New York, vol. 1, p. 336, pl. 34, figs. 1–8.

—— **canalis** Whitfield, 1889; Bull. Am. Mus. Nat. Hist., New York, vol. 2, p. 64, pls. 11, 12.

—— **cariboueneis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 98, pl. 12, figs. 7–7 a, b. Pogonip.

—— *caudatus*. (See **Dalmanites limulurus.**)

—— *cordieri*. (See **Dalmanites limulurus.**)

—— *corycœus*. (See **Proetus corycœus.**)

—— *crypturus*. (See **Homalonotus crypturus.**)

—— **curiosus** Billings, 1865; Pal. Foss., vol. 1, p. 318, fig. 305. Quebec.

—— ? **curiosus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 98, pl. 12, fig. 15.

—— *denticulatus*. (See **Dalmanites denticulatus.**)

—— *ditmarsiæ* Honeyman, 1879; Proc. Nova Scotia Inst. Nat. Sci., vol. 5, p. 18. (See **Homalonotus crypturus** Green.) Clinton?

—— **duirus** Green, 1839; Am. Jour. Sci., 1st series, vol. 37, p. 40. Hudson.

—— *edwardi*. (See **Dalmanites limulurus.**)

—— **emoryi** Hall, 1857; Rept. U. S. Mexican Boundary Survey, vol. 1, pl. 20, fig. 5. Not defined.

—— *extans*. (See **Bathyurus extans.**)

—— *gigas*. (See **Asaphus platycephalus.**)

—— [*Megalaspis?*] **goniocercus** Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, p. 480. Quebec.

—— **goniurus** Billings, 1860; Canadian Naturalist, vol. 5, p. 324. Quebec.

—— **goniurus** Billings, 1865; Pal. Foss., vol. 1, p. 415.

—— *halli*. (See **Cryphæus boothi.**)

—— **halli** Chapman, 1858; Annals Nat. Hist., 3d series, vol. 2, p. 14, fig. 2. Trenton and Utica.

—— **halli** Chapman, 1858; Canadian Jour., 2d series, vol. 3, p. 236, figure. This species is the same as *Asaphus canadensis* Chapman.

—— *hincksii* Chapman, 1859; Canadian Jour. Industry, Sci. and Arts, vol. 4, p. 2, figure. (See **Asaphus canadensis** Chapman.) Utica.

—— **homalononotoides** Walcott, 1877; Advanced sheets 31st Rept. New York State Mus. Nat. Hist., p. 20. Trenton.

—— **homalononotoides** Walcott, 1879; 31st Rept. New York State Mus. Nat. Hist., p. 71.

—— *homalononotoides* Whitfield (not Walcott), 1882; Geol. Wisconsin, vol. 4, p. 237. (See **Asaphus triangulatus.**)

—— **huttoni** Billings, 1865; Pal. Foss., vol. 1, p. 271, fig. 256. Quebec.

—— **illænoides** Billings, 1860; Canadian Naturalist, vol. 5, p. 323.

—— **illænoides** Billings, 1865; Pal. Foss., vol. 1, p. 414.

—— [*Isotelus*] **iowensis** Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 577, pl. 2 a, figs. 1–7. Trenton.

—— *laticostatus*. (See **Dalmanites anchiops.**)

—— ? **latimarginata** Hall, 1847; Pal. New York, vol. 1, p. 253, pl. 66, figs. 4 a, b. Utica.

—— *limulurus*. (See **Dalmanites limulurus.**)

—— **marginalis** Hall, 1847; Pal. New York, vol. 1, p. 24, pl. 4 *bis*, fig. 15. Chazy.

—— **marginalis** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 235, pl. 3, fig. 16.

—— [*Isotelus*] **maximus** Locke, 1838; 2d Ann. Rept. Geol. Survey Ohio, p. 246, figs. 8, 9. Trenton and Hudson.

Syn., *Isotelus megistos* Locke, 1841; Trans. Am. Assoc. Geol. Nat., p. 221, pl. 6.
Isotelus megistos Locke, 1842; Am. Jour. Sci., 1st series, vol. 42, p. 366, pl. 3,

Syn., *Isotelus megistos* Meek, 1873; Pal. Ohio, vol. 1, p. 157, pl. 14, fig. 13.
Isotelus megistos Miller, 1874, Cincinnati Quart. Jour. Sci., vol. 1, p. 137.
Asaphus megistos Walcott, 1884; Science, March 7, fig. 1, vol. 3, p. 200.

Asaphus megalopthalmus Troost, 1840; 5th Geol. Rept. Tennessee, p. 57. Trenton?

—— **micropleurus** Green, 1835; Suppl. Mon. Tril. North America, p. 21, cast No. 41.

—— *micrurus.* (See **Dalmanites micrurus.**)

—— *morrisi* Billings, 1865; Pal. Foss., vol. 1, p. 272, fig. 257, Syn. to **Asaphus huttoni** Billings.

—— *murchisoni* Castelnau, Syn. to **Asaphus platycephalus** Stokes.

—— *myrmecophorus.* (See **Dalmanites myrmecophorus.**)

—— *nasutus.* (See **Dalmanites nasutus.**)

—— ? *nodostriatus* Hall, 1847; Pal. New York, vol. 1, p. 248, pl. 61, figs. 1 a, b. (See **Bathyurus extans** Hall.)

—— **notans** Billings, 1866; Catalogue Silurian Foss. Anticosti, p. 25, fig. 8.
Compare *Asaphus maximus* Locke.

—— ? **obtusus** Hall, 1847; Pal. New York, vol. 1, p. 24, pl. 4 *bis*, fig. 14. Chazy.

—— **obtusus** Emmons, 1855; American Geology, vol. 2, pt. 2, p. 236, pl. 3, fig. 14.

—— **pelops** Billings, 1865; Pal. Foss., vol. 1, p. 317, fig. 304. Quebec

—— **platycephalus** Stokes, 1823; Trans. Geol. Soc. London, 2d series, vol. 1, p. 208, pl. 27. Trenton.

Syn., *Isotelus gigas* De Kay, 1824; Annals Lyceum Nat. Hist. New York, vol. 1, p. 176, pl. 12, fig. 1.
Isotelus planus De Kay, 1824; Annals Lyceum Nat. Hist. New York, vol. 1, p. 178, pl. 13, fig. 7.
Asaphus gigas Dalman, 1826; Palæad., p. 70.
Asaphus gigas and *planus* Dalman, 1826; Palæad., p. 70.
Isotelus gigas Green, 1832; Monthly Am. Jour. Geol., p. 560.
Isotelus gigas Green, 1832; Mon. Tril. N. A., p. 71, cast 21, 22.
Isotelus planus Green, 1832; Monthly Am. Jour. Geol., p. 560; Mon. Tril. N. A., p. 68, cast 23.
Isotelus stegops Green, 1832; Mon. Tril. N. A., p. 71, cast 26, 27.
Brongniartia isotelea Eaton, 1832; Geological Text Book, p. 33, pl. 2, fig. 23.

—— **platycephalus** Bronn, 1835; Lethæa Geogn., vol. 1, p. 115, pl. 9, fig. 8.

Syn., *Isotelus gigas* Milne-Edwards, 1840; Crust., vol. 3, p. 298.

—— **platycephalus** Buckland, 1840; Bridgw. Treatise, vol. 2, p. 76, pl. 63, fig. 12.

—— **platycephalus** Burmeister, 1843; Org. Trilobites, p. 110, pl. 2, fig. 12 (Ray Soc. ed., 1846).

Syn., *Isotelus gigas* Portlock, 1843; Geol. Rept. Londonderry, p. 295, pl. 7, fig. 1; pl. 8, fig. 1.
Isotelus planus Portlock, 1843; Geol. Rept. Londonderry, p. 295, pl. 7, figs. 2, 3.
Isotelus gigas Hall, 1847; Pal. New York, vol. 1, p. 231, pls. 60-63.
Isotelus gigas Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 215, pl. 16, fig. 12.

—— [*Isotelus*] **platycephalus** Bronn and Roemer, 1851-'56; Lethæa Geogn., vol. 1, p. 632, pl. 9, fig. 8; pl. 9^1, fig. 5.

—— **platycephalus** Nieszkowski, 1857; Mon. Sil. Ostseeprovinz, Tril., p. 37.

Syn., *Isotelus gigas* Rogers, 1858; Geol. Survey Pennsylvania, vol. 2, p. 819, fig. 610.

—— **platycephalus** Billings, 1863; Geol. Survey Canada, p. 184, fig. 183.

Syn., *Asaphus* (*Isotelus*) *gigas* Salter, 1864; Mon. Brit. Tril., p. 161, pl. 24, figs. 1-5; pl. 25, fig. 1 (var.).
Asaphus (*Isotelus*) *gigas* Salter, 1864; Mem. Geol. Survey United Kingdom, decade xi, pl. 3,

Asaphus platycephalus Billings, 1870; Quart. Jour. Geol. Soc. London, vol. 26, p. 486, pls. 31, 32.

Syn., *Isotelus gigas* Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 138.

—— **platyleurus** Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 169. (See **Dalmanitis platyleurus.**)

—— **polypleurus** Green, 1838; Am. Jour. Sci., 1st series, vol. 34, p. 380.

—— **quadraticaudatus** Billings, 1865; Pal. Foss., vol. 1, p. 273, fig. 258. Quebec.

—— **rœmingeri** Walcott, 1876; 28th Rept. New York State Mus. Nat. Hist., p. 96. Trenton.

—— *selenurus*. (See **Dalmanites selenurus.**)

—— *stokesi*. (See **Proetus stokesi.**)

—— **susæ** Calvin; MSS.

—— **susæ** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 236, pl. 5, fig. 3; pl. 10, fig. 8. Trenton.

—— **tetragonocephalus** Green, 1834; Am. Jour. Sci., 1st series, vol. 25, p. 135.

—— **tetragonocephalus** Green, 1835; Suppl. Mon. Tril. N. A., p. 12, cast 38.

—— [*Paradoxides*] **tetragonocephalus** Emmrich, 1839; De Tril., etc., p. 34.

The cast issued with Dr. Green's monograph as No. 38 may be the same species which Dr. Emmons afterwards described as *Atops trilineatus*. It has about sixteen segments in the thorax, also obscure nodes along the axis. The head shows the occular ridges of a *Ptychoparia*, whereas the segments are those characterictic of the *Oleni*. It is too imperfect for generic classification.

—— *trentonensis*. (See **Lichas trentonensis.**)

—— **triangulatus** Whitfield, 1880; Ann. Rept. Geol. Survey Wisconsin, 1879, p. 59. Trenton.

This species is the *Asaphus homalonotoides* of the Final Report, vol. 4, p. 237, pl. 5, fig. 4.

—— ? **trimblii** Green, 1837; Acad. Nat. Sci. Phila., Jour., vol. 7. Niagara.

—— **trimblii** Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 348.

—— [*Ogygia?*] **vetustus** Hall, 1847; Pal. N. Y., vol. 1, p. 227, pl. 60, fig. 1. Trenton and Hudson.

—— ? [*Ogygia*] **vetustus** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 216, fig. 72.

—— [*Isotelus*] **vigilans** Meek and Worthen, 1870; Proc. Acad. Nat. Sci. Phila., p. 53. Hudson.

—— [*Isotelus*] **vigilans** Meek and Worthen, 1875; Geol. Illinois, vol. 6, p. 491, pl. 23, fig. 6.

—— **wisconsensis** Walcott, 1876; 28th Rept. N. Y. State Mus. Nat. Hist., p. 97. Trenton.

Aspidolites Conrad, 1841; 4th Ann. Rept. Pal. Dept. New York Geol. Survey, p. 48.

Atops Emmons, 1844; Taconic System, p. 20.

Type, *Atops trilineatus* Emmons.

—— **trilineatus** Emmons 1844; Taconic System, p. 20, fig. 1, pl. 2, fig. 3. Taconic.

—— **trilineatus** Emmons, 1847; Nat. Hist. New York, Agriculture, vol. 1, p. 64, fig. 8, pl. 14, fig. 3.

Syn., *Calymene beckii* Hall, 1847; Pal. New York, vol. 1, p. 252, pl. 67, figs. 4 a–4 e (not *Calymene beckii* Green, or *Atops trilineatus* Emmons).

—— **trilineatus** Haldeman, 1848; Am. Jour. Sci., 2d series, vol. 5, p. 107.

—— **trilineatus** Emmons, 1849; Proc. Am. Assoc. Adv. Sci., 1st Meeting, Phila., 1848, pp. 16, 17.

Syn., *Calymene beckii* Fitch, 1849; Trans. Agric. Soc. New York, vol. 9, p. 865 (not *Calymene beckii* Green).

—— **trilineatus** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 115, pl. 1, fig. 16.

Syn., *Atops punctatus* Emmons, 1860; Manual Geology, p. 88, fig. 71; also p. 280.

Atops trilineatus Barrande, 1861; Bull. Soc. Géol. France, 2d series, vol. 18, p. 269, pl. 5, fig. 1.

—— **trilineatus** Barrande, 1861; Bull. Soc. Géol. France, 2d series, vol. 18, p. 271, pl. 5, fig. 3.

—— [*Conocephalites* (*Atops*)] **trilineatus** Ford, 1871; Am. Jour. Sci., 3d series, vol. 2, p. 33.

—— [*Conocephalites*] **trilineatus** Ford, 1873; Am. Jour. Sci., 3d series, vol. 6, p. 135.

—— [*Conocephalites* (*Atops*)] **trilineatus** Ford, 1879; Am. Jour. Sci., 3d series, vol. 9, p. 205.

—— [*Triarthrus*] **trilineatus** Miller, 1877; Catalogue Am. Pal. Foss., p. 223.

—— [*Conocoryphe*] **trilineatus** Ford, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 152.

Syn., *Triarthrus becki* Walcott, 1879; Trans. Albany Inst., vol. 10, p. 23.

—— [*Ptycoparia*] **trilineatus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 203, pl. 27, fig. 1 a–c.

—— [*Conocoryphe*] **trilineatus** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 197, pl. 1, fig. 7 a, b.

Bailiella Matthew, 1884; Trans. Royal Soc. Canada, vol. 1, p. 124 (used as a subgenus to *Conocoryphe* (*Bailiella*) *Baileyi*).

Barrandia Hall, 1860; 13th Rept. New York State Cab. Nat. Hist., p. 115 (not *Barrandia* McCoy). (See **Olenellus.**)

—— *thompsoni.* (See **Olenellus thompsoni.**)

—— *vermontana.* (See **Olenellus vermontana** and **Mesonasis vermontana.**)

Barrandia McCoy, 1849; Annals Nat. Hist., 2d series, vol. 4, p. 409.

Type, *Barrandia cordai* McCoy.

—— ? **mccoyi** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 96, pl. 12, fig. 5. Pogonip.

Bathynotus Hall, 1860; 13th Rept. New York State Cab. Nat. Hist., p. 117.

Type, *Bathynotus holopyga* Hall.

—— [*Peltura* (*Olenus*)] **holopyga** Hall, 1859; 12th Rept. New York State Cab. Nat. Hist., p. 61, figure.

—— [*Peltura* (*Olenus*)] **holopyga** Hall, 1859; Pal. New York, vol. 3, p. 528, figure.

Syn., *Paradoxides? quadrispinosus* Emmons, 1860; Manual Geology, p. 80, fig. 57.

Paradoxides (*Pagura*) *quadrispinosus* Emmons, 1860; Manual Geology, p. 280, fig. 57.

—— **holopyga** Hall, 1860; 13th Rept. New York State Cab. Nat. Hist., p. 118, figure.

—— **holopyga** Hall, 1861; Geol. Vermont, vol. 1, p. 371, pl. 13, fig. 3.

—— [*Peltura* (*Olenus*)] **holopyga** Barrande, 1861; Bull. Soc. Géol. France, 2d series, vol. 18, p. 278, pl. 5, figs. 9, 10.

—— **holopyga** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 191, pl. 31, figs. 1–1 a. Middle Cambrian.

Bathyurellus Billings, 1865; Pal. Foss., vol. 1, p. 262.

—— **abruptus** Billings, 1865; Pal. Foss., vol. 1, p. 263, fig. 247. Quebec.

—— [*Asaphiscus*] *bradleyi* Meek. (See **Asaphiscus bradleyi.**)

—— **expansus** Billings, 1865; Pal. Foss., vol. 1, p. 318, figs. 306 a, b. Quebec.

Compare *B. nitidus* and *B. marginatus* Billings.

—— **formosus** Billings, 1865; Pal. Foss., vol. 1, p. 265, fig. 250. Quebec.

—— **fraternus** Billings, 1865; Pal. Foss., vol. 1, p. 267, fig. 251. Quebec.

The head of this species may belong to Salter's genus *Stygina.*

—— **litoreus** Billings, 1865; Pal. Foss., vol. 1, p. 320. Quebec.

—— **marginatus** Billings, 1865; Pal. Foss., vol. 1, p. 263, fig. 248. Quebec.

Compare *B. nitidus* and *B. expansus* Billings.

—— **nitidus** Billings, 1865; Pal. Foss., vol. 1, p. 265, fig. 249. Quebec.

On page 320 Mr. Billings says that it may be found necessary to unite *B. nitidus*, *B. marginatus*, and *B. expansus* into one polymorphic species.

Bathyurellus rarus Billings, 1865; Pal. Foss., vol. 1, p. 320, no figure. Quebec.

—— [*Dikelocephalus*] **truncatus** Meek, 1873; 6th Ann. Rept. Geol. Survey Territories, p. 465 (no description given).

—— **validus** Billings, 1865; Pal. Foss., vol. 1, p. 268, fig. 252. Quebec.

—— [*Asaphiscus*] *wheeleri*. (See **Asaphiscus wheeleri**.)

Bathyuriscus Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, p. 484.

—— [*Bathyurus?*] **haydeni** Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, p. 483. Potsdam.

—— **haydeni** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 215.

—— **howelli** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 216, pl. 30, figs. 2, 2 a. Middle Cambrian.

Syn., *Embolimus rotundatus* (Rominger) Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165, referred to *Bathyuriscus howelli*.

—— [*Ogygia*] **producta** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 244, pl. 2, figs. 31–34. Middle Cambrian.

—— [*Ogygia*] **producta** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 245, pl. 2, fig. 35.

—— **producta** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 217, pl. 30, figs. 1, 1 a–c.

Bathyurus Billings, 1859; Canadian Naturalist, vol. 4, p. 364.

Type, *Bathyurus extans* Hall.

—— **amplimarginatus** Billings, 1857; Canadian Naturalist, vol. 4, p. 365, fig. 12 a, b. Calciferous.

—— **amplimarginatus** Billings, 1863; Geol. Canada, p. 122, fig. 41.

—— **amplimarginatus** Billings, 1865; Pal. Foss., vol. 1, p. 352, fig. 341 a.

—— **angelini** Billings, 1859; Canadian Naturalist, vol. 4, p. 467, fig. 37. Chazy.

—— **angelini** Billings, 1863; Geol. Canada, p. 133, fig. 68.

—— **arcuatus** Billings, 1865; Pal. Foss., vol. 1, p. 205, fig. 190. Quebec.

—— **armatus** Billings, 1860; Canadian Naturalist, vol. 5, p. 319, fig. 23.

—— **armatus** Billings, 1865; Pal. Foss., vol. 1, p. 411, fig. 392.

—— **armatus** Walcott, 1879; 32d Rept. New York State Mus. Nat. Hist., p. 131.

—— [*Dorypyge?*] **armatus** Vogdes, Bull. U. S. Geol. Survey No. 63 (this bulletin).

—— **bituberculatus** Billings, 1860; Canadian Naturalist, vol. 5, p. 319, fig. 22; also Geol. Canada, 1863, p. 238, fig. 270. Quebec.

—— **bituberculatus** Billings, 1865; Pal. Foss., vol. 1, p. 410, fig. 391.

If this species is correctly represented by Mr. E. Billings it can not be included within the limits of *Bathyurus*. As we know of no other to which it bears a resemblance, the new generic term of *Lloydia* is proposed, in honor of the first author on Trilobites, Edward Lhwyd. Diagnosis: Glabella tumid and extending to the frontal limb; basal lobes elongate-oval, pointed at both ends, separated from the glabella by shallow, obscure grooves; eyes opposite the mid length of the glabella; thorax unknown.

—— **breviceps** Billings, 1865; Pal. Foss., vol. 1, p. 262, fig. 246. Quebec.

—— **capax** Billings, 1860; Canadian Naturalist, vol. 5, p. 318, fig. 20. Quebec.

—— **capax** Billings, 1863; Geol. Canada, p. 238, fig. 271.

—— **capax** Billings, 1865; Pal. Foss., vol. 1, p. 409, fig. 389.

A similar species was referred by Mr. R. P. Whitfield (Geol. Survey Wisconsin, vol. 4, pl. 4, fig. 6) to *Dicellocephalus*.

—— **caudatus** Billings, 1865; Pal. Foss., vol. 1, p. 261, fig. 245. Quebec.

—— **conicus** Billings, 1859; Canadian Naturalist, vol. 4, p. 366, fig. 12 d. Calciferous.

—— **conicus** Billings, 1863; Geol. Canada, p. 122, fig. 42.

—— **conicus** Billings, 1865; Pal. Foss., vol. 1, p. 352, fig. 341 b.

—— **conicus** Whitfield, 1889; Bull. Am. Mus. Nat. Hist., vol. 2, No. 2, p. 61, pl. 13, figs. 15–21.

Bathyurus ? congeneris Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 92, pl. 12, fig. 8. Pogonip.

—— **cordai** Billings, 1860; Canadian Naturalist, vol. 5, p. 321, fig. 26. Calciferous.

—— **cordai** Billings, 1863; Geol. Canada, p. 238, fig. 269.

—— **cordai** Billings, 1865; Pal. Foss., vol. 1, p. 259, fig. 242; p. 412, fig. 395.

Compare this species with typical *Solenopleura*.

—— ? **crotalifrons** Dwight, 1884; Am. Jour. Sci., 3d series, vol. 27, p. 253, figs. 4, 4 a, 5, 6. Calciferous.

—— **cybele** Billings, 1859; Canadian Naturalist, vol. 4, p. 366, fig. 12 c. Calciferous.

—— **cybele** Billings, 1863; Geol. Canada, p. 122, fig. 43.

—— **cybele** Billings, 1865; Pal. Foss., vol. 1, p. 352, fig. 341 c.

—— **dubius** Billings, 1860; Canadian Naturalist, vol. 5, p. 319, fig. 21. Quebec.

—— **dubius** Billings, 1865; Pal. Foss., vol. 1, p. 410, fig. 390.

—— [*Asaphus?*] **extans** Hall, 1847; Pal. New York, vol. 1, p. 228, pl. 60, figs. 2 a–c. Trenton.

—— [*Asaphus?*] **extans** Hall, 1850; 3d Rept. New York State Cab. Nat. Hist., p. 174, pl. 3, figs. 1 a–c.

Syn., *Asaphus nodostriatus* Hall, 1850; 3d Rept. New York State Cab. Nat. Hist., p. 175.

—— **extans** Billings, 1863; Geol. Canada, p. 153, fig. 114.

—— **gregarius** Billings, 1865; Pal. Foss., vol. 1, p. 363, fig. 349. Potsdam.

Mr. Walcott (Bull. U. S. Geol. Survey, No. 10, p. 36) refers this species to the genus *Solenopleura* Angelin, and remarks that many of the Cambrian species of the genus *Bathyurus* described in the Canadian reports might be referred to that genus.

—— ? *haydeni*. (See **Bathyuriscus haydeni.**)

—— **longispinus** Walcott, 1876; 28th Rept. N. Y. State Cab. Nat. Hist., p. 94. Trenton.

—— **minganensis** Billings, 1865; Pal. Foss., vol. 1, p. 353. Calciferous.

—— *nero*. (See **Solenopleura nero (Billings) Walcott.**)

—— **oblongus** Billings, 1860; Canadian Naturalist, vol. 5, p. 321, fig. 25. Quebec.

—— **oblongus** Billings, 1865; Pal. Foss., vol. 1, p. 412, fig. 394.

—— **parvulus** Billings, 1861; Geol. Vermont, vol. 2, p. 952, fig. 361.

—— **parvulus** Billings, 1861; Pal. Foss., Bull. Geol. Sur. Canada p. 16, fig. 21. Potsdam.

—— **parvulus** Billings, 1865; Pal. Foss., vol. 1, p. 16, fig. 21.

—— **perplexus** Billings, 1865; Pal. Foss., vol. 1, p. 364, fig. 350. Potsdam.

—— **perspicator** Billings, 1865; Pal. Foss., vol. 1, p. 205, fig. 191. Quebec.

—— **pogonipensis** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 243, pl. 1, figs. 33, 34. Cambrian.

—— **quadratus** Billings, 1860; Canadian Naturalist, vol. 5, p. 321, fig. 27. Quebec.

—— **quadratus** Billings, 1865; Pal. Foss., vol. 1, p. 412, fig. 396.

—— **saffordi** Billings, 1860; Canadian Naturalist, vol. 5, p. 321, fig. 24. Quebec.

—— **saffordi** Billings, 1865; Pal. Foss., vol. 1, p. 259, fig. 341; p. 411, fig. 393.

—— **seelyi** Whitfield, 1886; Bull. Am. Mus. Nat. Hist., New York, vol. 1, No. 8, p. 339, pl. 33, figs. 12–18. Birdseye.

—— **seelyi** Whitfield, 1889; Bull. Am. Mus. Nat. Hist., New York, vol. 2, No. 2, p. 62, pl. 13, figs. 8–14.

—— **senectus** Billings, 1861; Bull. Geol. Sur. Canada, p. 16. Potsdam.

—— **senectus** Billings, 1861; Geol. Vermont, vol. 2, p. 953, figs. 359, 360.

—— **senectus** Billings, 1863; Geol. Canada, p. 286, figs. 298 a, b; Pal. Foss., vol. 1, p. 16 (1865), figs. 19, 20.

Referred to *Protypus senectus* Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 213, pl. 31, figs. 2, 2 a–c.

Bathyurus serratus Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, p. 460. Potsdam.

—— ? **simillimus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 93, pl. 12, fig. 11. Pogonip.

—— **smithi** Billings, 1863; Geol. Canada, p. 153, fig. 115. Trenton.

—— **smithi** Billings, 1865; Pal. Foss., vol. 1, p. 56.

—— **solitaricus** Billings, 1865; Pal. Foss., vol. 1, p. 362. Quebec.

—— [*Acidaspis*] **spiniger** Hall, 1847; Pal. New York, vol. 1, p. 241, pl. 64, fig. 5. Trenton.

—— **stonemani** Vogdes, 1884; 12th Ann. Rept. Geol. Nat. Hist. Minnesota, p. 8. Trenton.

—— **strenuus** Billings, 1865; Pal. Foss., vol. 1, p. 204, fig. 188. Quebec.

—— **taurifrons** Dwight, 1884; Am. Jour. Sci., 3d series, vol. 27, p. 252, pl. 7, figs. 1-3. Calciferous.

—— **timon** Billings, 1865; Pal. Foss., vol. 1, p. 261, fig. 244. Quebec.

—— ? **tuberculatus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 12, fig. 9. Pogonip.

—— **vetula** Billings, 1865; Pal. Foss., vol. 1, p. 365. Potsdam.

—— [*Agraulos* (*Bathyurus?*)] **woosteri** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, p. 56. Potsdam.

—— [*Agraulos* (*Bathyurus?*)] **woosteri** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 189, pl. 1, figs. 19-21.

Bohemilla Barrande, 1872; Syst. Sil. Bohême, Suppl., vol. 1, p. 137.

Type, *Bohemilla stupenda* Barrande.

Brongniartia Eaton, Am. Jour. Sci., 1st series, vol. 22, p. 166, and Geol. Text-Book, p. 32 (Syn., *Asaphus* in part), not *Brongniartia* Salter (subgenus *Homalonotus*).

—— *carcinoides* Eaton. (See **Triarthrus becki.**)

—— *isotelea.* (See **Asaphus platycephalus.**)

—— *platycephus* Eaton. (See **Homalonotus delphinocephalus.**)

Brachymetopus McCoy, 1847; Ann. Nat. Hist., vol. 20, p. 220.

Type, *Brachymetopus maccoyi* Portlock.

—— [*Phillipsia* (*Griffithides*)] **lodiensis** Meek, 1875; Pal. Ohio, vol. 2, p. 323, pl. 18, fig. 3. Waverly.

—— **lodiensis** Vogdes, 1888; Annals New York Acad. Sci., vol. 4, p. 102.

—— [*Phillipsia* (*Brachymetopus*)] *ornata* Hall. (See **Cyphaspis ornata.**)

Bronteus Goldfuss, 1839; Beiträge Petrefactenkunde, Nova Acta Physico-Med., vol. 19, p. 360, pl. 33, fig. 3.

Type, *Bronteus flabellifera* Goldfuss.

Syn., *Goldius* De Koninck, 1841; Mém. Crust. Foss. Belgique, p. 5.

—— **acamas** Hall, 1865; 20th Rept. New York State Cab. Nat. Hist., p. 332, pl. 21, figs. 19, 20. Niagara.

—— **acamas** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 422, pl. 21, figs. 19, 20 (rev. ed.).

—— **barrandi** Hall, 1859; Pal. New York, vol. 3, p. 350, pl. 63, figs. 1-4. Lower Helderberg.

—— **canadensis** Logan, 1844; Geol. Canada, p. 54, 2 figs. Lower Helderberg.

—— **insularis** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 66.

—— **laphami** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin (1877), p. 88. Niagara.

—— **laphami** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 310, pl. 22, figs. 1-4.

—— **lunatus** Billings, 1857; Geol. Canada, p. 338. Trenton.

—— **lunatus** Billings, 1863; Geol. Canada, p. 188, fig. 187.

—— ? **niagarensis** Hall, 1852; Pal. New York, vol. 3, p. 314, pl. 70, fig. 3. Niagara.

Bronteus occasus Winchell and Marcy, 1866; Mem. Boston Soc. Nat. Hist., vol. 1, p. 104, pl. 3, fig. 12. Niagara.

—— **occasus** (Winchell and Marcy) Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 400.

—— **pompilius** Billings, 1863; Proc. Portland Soc. Nat. Hist., p. 123, pl. 1, fig. 25. Upper Silurian.

—— **tullius** Hall, 1888; Pal. New York, vol. 7, p. 12, pl. 8, figs. 34–36. Hamilton.

Bumastus Murchison, 1839; Sil. Syst., p. 656. Subgenus, *Illænus*.

Calymene Brongniart, 1822; Crust. Fos., p. 9.

Type, *Calymene tuberculata* Bünnich, 1781.

Syn., *Prionocheilus*, Rouault, Bull. Soc. Géol. France, vol. 4, 1846, p. 309.

—— *anchiops*. (See **Dalmanites anchiops**.)

—— *beckii*. (See **Triarthrus becki**.)

—— **blumenbachi** Brongniart, 1822; Crust. Foss., p. 11, pl. 1, figs. 1 a–d.

—— **blumenbachi** Barrande, 1852; Syst. Sil. Bohême, pls. 19 and 45.

—— **blumenbachi** Salter, 1863; Mon. Brit. Trilobites, pl. 8, figs. 7–11, 13–16; pl. 9, fig. 1.

This species should take the older name of *Calymene tuberculata* Bünnich.

—— **blumenbachi** (Green) not Brong., Mon. Tril. N. A., p. 28, cast 1.

—— **blumenbachi** ? Foerste, 1885; Bull. Denison Univ., vol. 1, p. 100, pl. 13, fig. 25.

—— *bucklandi*. (See **Ceraurus pleurexanthus** Green.)

—— *bufo*. (See **Phacops bufo** Green.)

—— *bufo* var. *rana*. (See **Phacops rana** Green.)

—— **callicephala** Green, 1832; Mon. Tril. N. A., p. 30, cast 2.

—— **callicephala** Burmeister, 1843; Org. Trilobiten, p. 83, pl. 2, figs. 9–10 (Ray Soc. ed.).

—— **callicephala** Miller, 1882; Jour. Cincinnati Soc. Nat. Hist., vol. 5, p. 117, pl. 5, fig. 8.

The cast of this species (from a dark yellowish limestone of Hampshire County, Virginia), issued with Dr. Green's monograph, exhibits a *Calymene* with a broad frontal margin. The other specimens referred to by Dr. Green from Ohio and Indiana are species of the well-known *Calymene senaria* Conrad.

—— **camerata** Conrad, 1842; Jour. Acad. Nat. Sci. Phila., vol. 8, p. 278. Niagara.

—— **camerata** Hall, 1852; Pal. New York, vol. 2, p. 337, pl. 78, figs. 10 a–f.

—— **christyi** Hall, 1860; 13th Rept. New York State Cab. Nat. Hist., p. 119. Hudson.

—— **christyi** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., pl. 10, figs. 1, 2, and 5.

—— **christyi** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 107, pl. 4, figs. 13–15.

—— **christyi** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 141.

—— [*Hemicrypturis*] **clintoni** Vanuxem, 1842; Geol. New York, 3d Geol. Dist., p. 79, fig. 3; also p. 80. Clinton.

—— **clintoni** Hall, 1852; Pal. New York, vol. 2, p. 298, pl. 66 a, figs. 5 a–d.

—— **clintoni** Rogers, 1858; Geol. Survey Pennsylvania, vol. 2, p. 823, fig. 637.

—— **clintoni** Vogdes, 1880; Proc. Acad. Nat. Sci. Phila., p. 178, figs. 3, 4 (not fig. 3).

—— *clintoni* Vogdes, 1886; Des. New Species Foss. Crust. Clinton Group, p. 5, figs. 3, 4. (See **Calymene vogdesii** Foerste.)

—— **conradi** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 236. Hudson.

—— *crassimarginata*. (See **Proetus crassimarginata**.)

—— *diops* Green, 1832; Mon. Tril. N. A., p. 37, pl. 1, fig. 2, cast 8 (*Proetus diops*).

—— *macrophthalma* Green, 1832; Mon. Tril. N. A., p. 39, cast 9. (See **Phacops bufo**.)

—— **mamillata** Hall, 1861; Geol. Wisconsin, p. 50. Trenton.

—— **mamillata** Hall, 1862; Geol. Wisconsin, vol. 1, p. 432, figs. 1, 2.

—— *marginatus*. (See **Proetus marginatus**.)

Calymene microps Green, 1832; Mon. Tril. N. A., p. 34, cast 6.

—— **multicosta** Hall, 1847; Pal. New York, vol. 1, p. 228, pl. 60, fig. 3. Trenton.

—— **nasuta** Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 131, fig. 3. Niagara.

—— **niagarensis** Hall, 1843; Geol. New York, 4th Dist., p. 102, fig. 3 (on p. 101). Niagara.

—— *blumenbachii* var. **niagarensis** Hall, 1852; Pal. New York, vol. 2, p. 307, pl. 67, figs. 11, 12.

—— *blumenbachii* Roemer, 1860; Sil. Fauna W. Tenn., p. 79, pl. 5, fig. 22.

—— **niagarensis** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 153, pl. 7, figs. 14, 15.

—— **niagarensis** Hall; 20th Rept. New York State Cab. Nat. Hist., p. 334; revised edition, p. 425.

—— **niagarensis** Hall, 1876; Illus. Devon. Foss. Crustacea, pl. 1, fig. 10.

—— **niagarensis** Hall, 1879; 28th Rept. N. Y. State Mus. Nat. Hist., p. 187, pl. 32, figs. 8–15.

—— **niagarensis** Hall, 1883; 11th Ann. Rept. Geol. Nat. Hist. Indiana, 1881, p. 331. pl. 34, figs. 8–15.

Compare *C. brevicapitata* (Portlock) McCoy; Brit. Pal. Foss., pl. 1 F, fig. 4.

—— *nupera*. (See **Phacops nupera**.)

—— *odontocephala*. (Syn., *Dalmanites selenus*.)

—— **phlyctainodes** Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 167.

Dr. Green compares this species with *Encrinurus variolaris*.

—— **platys** Green, 1832; Mon. Tril. N. A., p. 32, casts 4, 5. Upper Helderberg.

—— **platys** Hall, 1861; Des. New Species Foss., p. 54.

—— **platys** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 82.

—— **platys** Hall, 1876; Illus. Devon. Foss. Crustacea, pl. 1, figs. 1–9.

—— **platys** Hall, 1888; Pal. New York, vol. 7, p. 1, pl. 1, figs. 1–9; pl. 25, figs. 1, 2.

—— *rana*. (See **Phacops rana** Green.)

—— **rostrata** Vogdes, 1879; Am. Jour. Sci., 3d series, vol. 18, p. 477. Clinton.

—— **rostrata** Vogdes, 1880; Proc. Acad. Nat. Sci. Phila., p. 176, figs. 1, 2.

—— **rostrata** Vogdes, 1886; Des. New Species Foss. Crust. Clinton Group, p. 2, figs. 1, 2.

—— *rowi*. (See **Phacops rowi** Green.)

—— **rugosa** Shumard, 1855; 1st and 2d Repts. Geol. Missouri, p. 200, pl. B, fig. 14. Lower Helderberg.

—— *selenecephala*. (See **Calymene senaria** Conrad.)

—— **senaria** Conrad, 1841; 4th Ann. Rept. Pal. Dept. New York Geol. Survey, p. 49. Trenton.

—— **senaria** Emmons, 1842; Geol. New York, 2d Geol. Dist., p. 390, fig. 2.

Syn., *selenecephala* Green, 1832; Mon. Tril. N. A., p. 31, cast 3.

blumenbachii Green, 1832; Mon. Tril. N. A., p. 28, cast 1. (Not of Brongniart.)

callicephala Green, 1832; Mon. Tril. N. A., p. 31. (Specimens from Ohio and Indiana only.)

brevicapitata Salter, 1848; Mem. Geol. Surv. United Kingdom, vol. 2, p. 341, pl. 11, figs. 1, 2. (Not of Portlock, 1843; Geol. Rept. Londonderry, etc., p. 286, pl. 3, fig. 3.)

brevicapitata (Portlock) Salter; Mem. Geol. Surv. United Kingdom, vol. 3, pl. 17, figs. 11, 12. (Not of Portlock.)

forcipata (McCoy) Salter; Palæon. Soc. London, vol. 17, p. 97. (Not of McCoy, Sil. Foss. Ireland, pl. 4, fig. 14.)

—— **senaria** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 213, pl. 16, fig. 9.

—— **senaria** Hall, 1847; Pal. New York, vol. 1, p. 238, pl. 64, figs. 3 a–n.

Calymene [*blumenbachii*] var. **senaria** Hall, 1852; Pal. New York, vol. 2, p. 299, pl. 66 a, figs. 6 a–o. Clinton.

—— **senaria var. blumenbachii** Salter, 1865; Mon. Brit. Tril., p. 97, pl. 9, figs. 6–10 (not figs. 7, 8, *Calymene brevicapitata* Portlock).

—— **senaria** Meek, Pal. Ohio, vol. 1, p. 173, pl. 14, figs. 14 a–f.

—— **senaria** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 140.
Syn., *callicephala* (Green) Miller, 1877; Catalogue Am. Pal. Foss., p. 213.

—— **senaria** White, 1880; 2d Ann. Rept. Dept. Statistics Geol. Indiana, p. 493, pl. 2, figs. 1, 2.
Syn., *callicephala* (Green) Miller, 1882; Jour. Cincinnati Soc. Nat. Hist., vol. 5, p. 117, pl. 5, fig. 8.

—— **senaria** Walcott, 1887; Notes on Some Sections of Trilobites, pl. 1.

—— **senaria** Walcott, 1884; Science, March 7, 1884, vol. 3, p. 201, figs. 2, 3.

—— **spinifera** Conrad, 1842; Jour. Acad. Nat. Sci. Phila., vol. 8, p. 277.
Compare *Cyphaspis girardeauensis*.

—— *trisulcata*. (See **Phacops trisulcata.**)

—— **vogdesii** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 95, pl. 8, figs. 12–16. Clinton.

—— ? *blumenbachi* Foerste, 1886; Bull. Denison Univ., vol. 1, p. 190, pl. 13, fig. 24.
Syn., *clintoni* Vogdes, 1882; Proc. Acad. Nat. Sci. Phila., p. 178, fig. 3 (not fig. 4).
clintoni Vogdes, 1886; Des. New Species Foss. Crust. Clinton Group, p. 5, fig. 3 (not fig. 4).

Ceratocephala Warder, 1838. (See **Acidaspis.**)

—— *ceralepta* Anthony. (See **Acidaspis ceralepta.**)

—— **goniata** Warder, 1838; Am. Jour. Sc., 1st series, vol. 34, p. 378, figure.

Ceratolichas Hall, 1888; Pal. New York, vol. 7, p. xl. Subgenus *Lichas*.

Ceraurus Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 560, pl., fig. 6; Mon. Tril. N. A., p. 83, cast 33, pl., fig. 10.

Ceraurus Hall, 1847; Pal. New York, vol. 1, p. 242.
Syn., *Otarion* (in part) Zenker, 1833; Beiträge Nat. Urwelt, p. 44.
Arges (in part) Goldfuss, 1843; Neues Jahrbuch für Mineral., p. 5.
Cyphaspis (in part) Burmeister, 1843, Org. Trilobiten, p. 104.
Amphion (in part) Portlock, 1843; Geol. Survey Londonderry, etc., p. 272.
Cyphaspis (in part) McCoy, 1846; Sil. Foss. Ireland, p. 44.
Cheirurus Beyrich, 1846; Unters. Trilobiten, etc. II, p. 3.
Eccoptochile Corda, 1847; Prodr., p. 245.
Actinopeltes Corda, 1847; Prodr., p. 247.
Crotalocephalus Salter, 1853; Mem. Geol. Survey United Kingdom, decade 7, pl. 2, p. 10.
Cyrtometopus Angelin, 1854; Pal. Scand., p. 32.
Sphærocoryphe Angelin, 1854; Pal. Scand., p. 65.
Pseudosphærexochus Schmidt, 1881; Rev. Baltic Sil. Tril., p. 130.
Nieszkowskia Schmidt, 1881; Rev. Baltic Sil. Tril., p. 130.
Type, *Ceraurus pleurexanthemus* Green.

—— [*Cheirurus*] **appollo** Billings, 1860; Canadian Naturalist, vol. 5, p. 322, fig. 28. Quebec.

—— [*Cheirurus*] **appollo** Billings, 1865; Pal. Foss., vol. 1, p. 413, fig. 397.

—— [*Cheirurus*] *bimucronatus* (Murch.) Roemer, Die sil. Fauna W. Tenn., p. 80, pl. 5, fig. 19, not of Murchison. (See **Ceraurus niagarensis** Hall.)

—— *crosotus* Lock. (See **Acidaspis crosotus.**)

—— [*Cheirurus*] **eryx** Billings, 1860; Canadian Naturalist, vol. 5, p. 322, fig. 30. Quebec.

—— [*Cheirurus*] **eryx** Billings, 1865; Pal. Foss., vol. 1, p. 413, fig. 399.

—— [*Cheirurus*] **glaucus** Billings, 1865; Pal. Foss., vol. 1, p. 323, fig. 308. Quebec.

Ceraurus [*Cheirurus*] **icarus** Billings, 1860; Canadian Naturalist, vol. 5, p. 67, fig. 14. Hudson.

—— [*Cheirurus*] **icarus** Billings, 1863; Geol. Canada, p. 219, fig. 231.

—— **icarus** Meek, 1873; Pal. Ohio, vol. 1, p. 162, pl. 14, fig. 11 a, b, c.

—— **icarus** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 133.

—— [*Cheirurus*] **insignis** (Beyrich) Hall, 1852; Pal. New York, vol. 2, p. 300, also p. 306, pl. 67, figs. 9, 10.

Not of Beyrich, 1845; Ueber einige böhm. Tril., p. 12, pl. 1, fig. 1,

—— *insignis*. (See **Ceraurus niagarensis** Hall.)

—— **mercurius** Billings, 1865; Pal. Foss., vol. 1, p. 285, fig. 272. Quebec.

—— **niagarensis** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 376, pl. 21, fig. 10.

—— **niagarensis** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist. (2d ed.), p. 427, pl. 21, figs. 10, 11.

Syn., *Sphærexochus romingeri?* Hall; Doc. Ed. 28th Rept. New York State Mus. Nat. Hist.

Explanation of pl. 32, fig. 16 (erroneous reference).

—— [*Cheirurus*] **niagarensis** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 189, pl. 32, fig. 16.

Syn., *Cheirurus bimucronatus* (Murch.) Roemer; Die sil. Fauna W. Tenn., p. 80, pl. 5, fig. 19.

—— **niagarensis** Hall, 1882; 12th Ann. Rept. Geol. Nat. Hist. Indiana, 1881, p. 335, pl. 34, fig. 16; pl. 33, fig. 10.

—— [*Cheirurus*] **numitor** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 27, fig. 11. Hudson.

—— [*Cheirurus*] **nuperus** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 61, fig. 20. Anticosti.

—— [*Cheirurus*] **perforator** Billings, 1865; Pal. Foss., vol. 1, p. 287, fig. 275. Quebec.

—— **pleurexanthemus** Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 560, pl., fig. 10. Trenton and Hudson.

—— **pleurexanthemus** Green, 1832; Mon. Tril. N. A., p. 84, fig. 10, pl. 1, cast 33.

Syn., *Calymene bucklandi* Anthony, 1838; Am. Jour. Sci., 1st series, vol. 36, p. 106, figs. 1, 2.

—— **pleurexanthemus** Hall, 1847; Pal. New York, vol. 1, p. 242, pl. 65, figs. 1 a–n; pl. 66, figs. 1, 1 h.

—— **pleurexanthemus** Emmons, 1855; Am. Geology, vol. 1, p. 217, pl. 15, figs. 1 a–k.

—— [*Cheirurus*] **pleurexanthemus** Billings, 1863; Geol. Canada, p. 188, fig. 188.

—— **pleurexanthemus** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 132.

—— **pleurexanthemus** Walcott, 1875; Annals Nat. Hist. New York, vol. 11, p. 155, pl. 11.

—— **pleurexanthemus** Walcott, 1881; Bull. Mus. Comp. Zool. Harvard Coll., vol. 8, p. 211, pl. 5, figs. 1–6.

—— [*Cheirurus*] **polydorus** Billings, 1865; Pal. Foss., vol. 1, p. 286, fig. 274. Quebec.

—— [*Cheirurus*] **pompilius** Billings, 1865; Pal. Foss., vol. 1, p. 181, fig. 162. Chazy and Hudson.

—— [*Cheirurus*] **prolificus** Billings, 1865; Pal. Foss., vol. 1, p. 285, fig. 273; p. 325, fig. 311. Quebec.

—— ? **pustulosa** Hall, 1847; Pal. New York, vol. 1, p. 246, pl. 61, fig. 2 a–h. Trenton.

—— **rarus** Walcott, 1877; Advanced sheets 31st Rept. New York State Mus. Nat. Hist., p. 15. Trenton.

—— **rarus** Walcott, 1879; 31st Rept. New York State Mus. Nat. Hist., p. 68.

—— [*Cheirurus*] **satyrus** Billings, 1865; Pal. Foss., vol. 1, p. 324, fig. 309. Chazy.

Ceraurus [*Cheirurus*] **sol** Billings, 1865; Pal. Foss., vol. 1, p. 288, fig. 276. Quebec.

—— [*Cheirurus*] **solitarius** Billings, 1865; Pal. Foss., vol. 1, p. 206. Quebec.

—— [*Cheirurus*] **tarquinius** Billings, 1863; Proc. Portland Soc. Nat. Hist., vol. 1, p. 121, pl. 1, fig. 22. Upper Silurian.

—— *vigilans*. (See **Encrinurus vigilans.**)

—— [*Cheirurus*] **vulcanus** Billings, 1865; Pal. Foss., vol. 1, p. 284, fig. 27; p. 324, fig. 310. Quebec.

Chariocephalus Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 175.

Type, *Chariocephalus whitfieldi* Hall.

—— **tumifrons** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 224, pl. 2, figs. 38, 39. Potsdam.

—— ? **tumifrons** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 61, pl. 10, fig. 16.

—— **whitfieldi** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 175, pl. 6, figs. 49–53; pl. 10, fig. 20. Potsdam.

Chasmops McCoy, 1849; Annals Mag. Nat. Hist., 2d series, vol. 4, p. 403. (See **Dalmanites** [*Chasmops*] **anchiops, anchiops** var. **armatus, anchiops** var. **sobrinus, D.** [*Chasmops*] **calypso, D.** [*Chasmops*] **erina, D.** [*Chasmops*] **macrops.**

—— [*Dalmanites*] **troosti** Safford, 1869; Geol. Tennesseé, p. 290. Trenton.

—— **troosti** Safford and Vogdes, 1889; Proc. Acad. Nat. Sci. Phila., p. 167, figure.

Conocephalus Zenker, 1833; Beiträge Nat. Urwelt, p. 48.

Conocephalites Barrande, 1852; Syst. Sil. Bohême, vol. 1, p. 415.

For species previously classed under these genera, see **Conocoryphe, Ptychoparia,** and **Crepicephalus.**

Conocoryphe Corda, 1847; Prodr., p. 139, pl. 2, fig. 10.

Type, *Conocoryphe sulzeri* Schlotheim.

—— [*Conocephalites*] **baileyi** Hartt, 1868; Acadian Geology, p. 645 (3d ed.). St. John.

—— **baileyi** Matthew, 1884; Trans. Royal Soc. Canada, vol. 1, p. 111, pl. 1, figs. 22–27.

—— [*Bailiella*] **baileyi** Matthew, 1884; Trans. Royal Soc. Canada, vol. 1, pl. 1, fig. 22.

—— [*Salteria*] **baileyi** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 32, pl. 4, figs. 3, 3 a; pl. 5, figs. 7, 7 a.

The author herein proposed the subgenus *Salteria* (corrected to *Bailiella*) for *Erinnys* Salter, a preoccupied generic name; the same is true of *Salteria*, used for a genus of fossil Crustacea.

—— [*Conocephalites*] **calcifera** Walcott, 1879; 32d Rept. New York State Mus. Nat. Hist., p. 129. Calciferous.

—— [*Conocephalites*] **cordilleræ** Rominger, 1887; Proc. Acad. Nat. Sci. Phila., p. 17, pl. 1, fig. 7. Cambrian.

—— **elegans** Hartt, 1868; Acadian Geol. (3d ed.), p. 650. St. John.

—— **elegans** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 33, pl. 4, figs. 2, 2 a, b.

—— *gemini-spinosus* Hartt. (See **Conocoryphe matthewi.**)

—— [*Conocephalites*] **hartti** Walcott, 1879; 32d Rept. New York State Mus. Nat. Hist., p. 131. Calciferous.

—— [*Conocephalites*] **matthewi** Hartt, 1868; Acadian Geology, p. 646, fig. 224. St. John.

—— [*Conocephalites*] **matthewi** Matthew, 1884; Trans. Royal Soc. Canada, vol. 1, p. 103, pl., figs. 6–21.

Syn., *Harttia matthewi* Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 19, pl. 1, fig. 3.

—— **matthewi** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 28, pl. 4, figs. 1, 1 a, b.

—— [*Conocephalites*] **optatus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 122, pl. 5 a, fig. 7. Potsdam.

—— [*Conocephalites*] *trilineatus*. (See **Atops trilineatus** Emmons.)

Conocoryphe [*Conocoryphe*] *trilineatus*. (See **Atops trilineatus** Emmons.)

—— [*Bailella*] **walcotti** Matthew, 1884; Trans. Royal Soc. Canada, vol. 1, p. 119, pl. 1, figs. 36–36 b. St. John.

—— **walcotti** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 30.

Conolichas Dames, 1877; Zeitschr. Deutsch. geol. Gesell., Berlin, 1877, p. 806. *Conolichas*, subgenus *Lichas* Hall, 1888; Pal. New York, vol. 7, p. xxxix.

Coronura Hall, 1888; Pal. New York, vol. 7, p. xxxii. (See **Dalmanties** [*Coronura*] **aspectans**, **D.** [*Coronura*] **myrmecophorus**, and **D.** [*Coronura*] **emarginatus.**)

Corycephalus Hall, 1888; Pal. New York, vol 7, p. xxxiv. (See **Dalmanites** [*Corycephalus*] **regalis**, **D.** [*Corycephalus*] **pygmæus**, and **D.** [*Corycephalus*] **dentatus.**)

Crepicephalus Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 576.

There is hardly a question that Dr. D. D. Owen had before him when he wrote the description of his genus *Crepicephalus* a true *Ptychoparia*. He remarks: "The rather flat, slipper-shaped glabella is tapering and slightly acuminated anteriorly, with a faint ridge on the median line; two small and very superficial depressions and a posterior faint furrow very partially divide the glabella. The facial sutures run nearly parallel to the margin of the glabella and join a thickened, cord-like anterior narrow border, inclosing a convex area, narrower in front than at the sides. Oblique plications can sometimes be traced on the cheek-plate in advance of the eye, converging towards the apex of the glabella." He refers the following figures to the genus: Plate 1, fig. 8, *Crepicephalus?*, pygidium from the Miniskah Trilobite grit. Plate 1, fig. 13, *Crepicephalus? wisconensis* (n. s.), part of cephalothorax and a portion of the cephalic shield of *D. granulosus?*. Plate 1 a, fig. 10, glabella of *Crepicephalus* n. g., near Miniskah. Plate 1 a, fig. 14, pygidium of *Crepicephalus? miniscaenis* n. s., from Miniskah grits. Plate 1 a, fig. 16, pygidium and portion of *Crepicephalus* (?) and portions of cephalothorax of that genus, from the Miniskah Trilobite grit. Plate 1 a, fig. 18, glabella of *Crepicephalus*, near Miniskah, Mississippi River.

—— [*Bathyurus?*] *angulatus* Hall and Whitfield. (See **Ptychoparia angulatus.**)

—— [*Loganellus*] *anytus* Hall and Whitfield. (See **Ptychoparia anytus.**)

—— [*Loganellus*] *centralis* Whitfield. (See **Ptychoparia oweni.**)

—— **gibbsi** Whitfield, 1880; Ann. Rept. Geol. Survey Wisconsin, 1879, p. 50. Potsdam.

—— **gibbsi** Whitfield, 1880; Geol. Wisconsin, vol. 2, p. 67.

—— **gibbsi** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 184, pl. 10, figs. 12, 13.

—— [*Loganellus*] *granulosa* Hall and Whitfield. (See **Ptychoparia granulosa.**)

—— [*Loganellus*] *haguei*. (See **Lisostracus haguei** and **Ptychoparia haguei.**)

—— [*Loganellus*] *maculosus* Hall and Whitfield. (See **Ptychoparia maculosus.**)

—— [*Loganellus*] *montanensis* Whitfield. (See **Ptychoparia montanensis.**)

—— [*Loganellus*] *nitidens* Hall and Whitfield. (See **Ptychoparia nitidens.**)

—— **onustus** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 53. Potsdam.

—— **onustus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 182, pl. 1, figs. 22, 23.

—— *oweni*. (See **Agraulos oweni** and **Ptychoparia oweni.**)

—— [*Loganellus*] *planus* Whitfield. (See **Ptychoparia planus.**)

—— [*Loganellus*] *quadrans* Hall and Whitfield. (See **Ptychoparia quadrans.**)

—— [*Loganellus*] *simulator* Hall and Whitfield. (See **Ptychoparia nitidens.**)

—— [*Loganellus*] *unisulcatus* Hall and Whitfield. (See **Ptychoparia unisulcatus.**)

—— *? wisconsensis* Owen. (See **Anomocare wisconsensis.**)

Crepicephalus Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 35.
Type, *Dikelocephalus? iowensis* Owen.

Crepicephalus augusta Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 208, pl. 28, figs. 2, 2 a, b. Middle Cambrian.

—— [*Dikelocephalus?*] **iowensis** Owen, 1852; Rept. Geol. Wisconsin, Iowa, and Minnesota, p. 575, pl. 1, fig. 4; pl. 1 a, fig. 13. Potsdam.

Undetermined Trilobite Owen, 1848; Rept. Geol. Reconnoissance Chippewa Land Dist., p. 14, pl. 7, fig. 1.

—— [*Conocephalites*] **iowensis** Shumard, 1863; Trans. Acad. Sci. St. Louis, vol. 2, p. 102.

—— [*Conocephalites*] **iowensis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 162, pl. 7, fig. 33; pl. 8, figs. 10–12 and 30.

—— **iowensis** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 36.

—— **iowensis** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 207.

—— **liliana** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 209, pl. 28, figs. 3, 3 a, c. Middle Cambrian.

Cryphæus Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 343.

Type, *Cryphæus boothi* Green.

—— [*Dalmanites* (*Cryphæus*)] **barrisi** Hall, 1888; Pal. New York, vol. 7, p. 48, pl. 16 a, fig. 18. Hamilton.

—— **boothi** Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 343, figure. Hamilton.

Syn., *Cryphæus greeni* Conrad, 1839; 2d Ann. Rept. Pal. Dept. New York Geol. Survey, p. 66.

Cryphæus calliteles Conrad, 1839; 2d Ann. Rept. Pal. Dept. New York Geol. Survey, p. 62.

Asaphus halli Conrad, 1840; 3d Ann. Rept. Pal. Dept. New York Geol. Survey, p. 204.

Cryphæus calliteles Hall, 1843; Geol. New York, pt. 4, p. 201.

Cryphæus calliteles De Verneuil, 1850; Bull. Soc. Géol. France, 2d series, vol. 7, p. 164, pl. 1, fig. 3.

Phacops pectinatus F. A. Roemer, 1850; Beiträge zur Kenntn. Harzgeb., p. 62, pl. 9, fig. 27.

Dalmania calliteles Emmons, 1860; Manual Geology, p. 138, fig. 124 (?).

—— [*Dalmania*] **boothi** Hall, 1861; Des. New Species of Fossils, p. 63.

—— [*Dalmania*] **boothi** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 91.

—— [*Dalmanites*] **boothi** Hall, 1876; Illus. Devonian Foss., pl. 16, figs. 1–6, 9–11, 13, 15, 16.

Syn., *Cryphæus stellifer* Kayser, 1878; Abhandl. geol. Specialkarte Pr., vol. 2, pt. 4, p. 33, (in part).

Cryphæus laciniatus Kayser, 1878; *idem.*, p. 34.

—— [*Dalmanites* (*Cryphæus*)] **boothi** Hall, 1888; Pal. New York, vol. 7, p. 42, pl. 16, figs. 1–4; pl. 16 a, figs. 3–8.

—— **callitelus** Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 346. Hamilton.

—— [*Dalmanites*] **boothi** Hall, 1876; Illus. Devonian Foss., pl. 16, figs. 7, 8, 12, 14.

—— (?) **callitelus** Kayser, 1878; Abhandl. geol. Specialkarte Pr., vol. 2, pt. 4, p. 32, pl. 3, fig. 10.

—— [*Dalmanites* (*Cryphæus*)] **boothi var. calliteles** Hall and Clarke, 1888; Pal. New York, vol. 7, p. 45, pl. 16, figs. 5–22; pl. 16 a, figs. 9–17.

—— [*Dalmanites* (*Cryphæus*)] **comis** Hall, 1888; Pal. New York, vol. 7, p. 41, pl. 16 a, fig. 1. Corniferous.

—— [*Dalmania*] **pleione** Hall, 1861; Des. New Species Fossils, p. 62. Hamilton.

—— [*Dalmania*] **pleione** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 90.

—— [*Dalmanites*] **pleione** Hall, 1876; Illus. Devonian Foss., pl. 16, fig. 17.

—— **pleione** Kayser, 1878; Abhandl. geol. Specialkarte Pr., vol. 2, pt. 4, p. 33.

Cryphæus [*Dalmanites* (*Cryphæus*)] **pleione** Hall, 1888; Pal. New York, vol. 7, p. 41, pl. 16 a, fig. 2.

Cryptolithus Green, 1832; Mon. Tril. North America, p. 72.

This generic should replace that of *Trinucleus* Murch., 1839.

Cryptonymus Eichwald, 1825; Syn. to *Asaphus*, *Illænus*, and *Niobe*.

Cryptonymus Eichwald, 1840. (See **Encrinurus.**)

Cybele Löven, 1845; Svenska Vetensk. Akad. Förhandl., p. 110.

Type, *Cybele bellatula* Dalman.

—— *punctata* Hall. (See **Encrinurus ornatus.**) 1843

Cyphaspis Burmeister, 1843; Org. Trilobiten, p. 98.

Type, *Cyphaspis ceratopthalma* Burmeister.

—— **christyi** Hall, 1863; Trans. Albany Inst., vol. 4, p. 220. Niagara.

—— **christyi** Hall, 1875; 28th Rept. New York State Mus. Nat. Hist., pl. 32, figs. 5–7.

—— **christyi** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 188, pl. 32, figs. 5–7.

—— **christyi** White, 1880; 2d Ann. Rept. Dept. Statistics and Geol. Indiana, p. 493, pl. 3, fig. 9.

—— **christyi** Hall, 1882; 11th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, 1881, p. 333, pl. 34, figs. 5–7.

—— **cœlebs** Hall, 1888; Pal. New York, vol. 7, p. 151, pl. 24, fig. 1. Lower Helderberg.

—— **craspedota** Hall, 1888; Pal. New York, vol. 7, p. 148, pl. 24, figs. 15–20. Hamilton.

—— **diadema** Hall, 1888; Pal. New York, vol. 7, p. 144, pl. 24, fig. 13. Upper Helderberg.

—— **girardeauensis** Shumard, 1855; 1st and 2d Rept. Geol. Missouri, p. 197, pl. B, fig. 11 a, b.

—— **girardeauensis** Emmons, 1860; Manual Geology, p. 159, fig. 145 (2).

—— **hybrida** Hall, 1888; Pal. New York, vol. 7, p. 144, pl. 24, fig. 14. Upper Helderberg.

—— [*Phillipsia*] **lævis** Hall, 1876; Illus. Devonian Foss., pl. 21, fig. 29.

—— **lævis** Hall, 1888; Pal. New York, vol. 7, p. 150, pl. 21, fig. 29. Chemung.

—— [*Phillipsia*] **minuscula** Hall, 1876; Illus. Devonian Foss., pl. 20, fig. 17. Upper Helderberg.

—— **minuscula** Hall, 1888; Pal. New York, vol. 7, p. 140, pl. 20, fig. 17; pl. 24, figs. 7–12.

—— [*Phillipsia?* (*Brachymetopus?*)] **ornata** Hall, 1876; Illus. Devonian Foss., pl. 21, fig. 1. Hamilton.

Syn., *Phillipsia coronata* Miller, 1877; Catalogue Am. Pal. Foss., p. 221.
Phillipsia coronata? Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 211.

—— **ornata** Hall, 1888; Pal. New York, vol. 7, p. 145, pl. 21, fig. 1; pl. 24, fig. 21.

—— **ornata** var. **baccata** Hall, 1888; Pal. New York, vol. 7, p. 146, pl. 24, figs. 22, 23.

—— **stephanophora** Hall, 1888; Pal. New York, vol. 7, p. 142, pl. 24, figs. 2–6. Upper Helderberg.

Dalmania Emmrich, 1844; Zur Naturgeschichte Trilobiten, p. 15.

This name having been used in 1830 for a genus of the Diptera, J. Barrande suggested that of *Dalmanites*.

Dalmanites (Emmrich) Barrande, 1872; Syst. Sil. Bohême, Suppl., vol. 1, p. 27.

Type, *Dalmanites caudatus* Bünnich.

Syn., *Pleuracanthus* Milne-Edwards, 1840; Crust., vol. 3, p. 329.
Odontochile Corda, 1847; Prodr., p. 208, pl. 5, fig. 56.
Osteropyge Corda, 1847; Prodr., p. 241, pl. 6, fig. 66.
Metacanthus Corda, 1847; Prodr., p. 242, pl. 6, fig. 67.
Chasmops McCoy, 1849; Annals Nat. Hist., 2d series, vol. 4.

Syn., *Cryphæus* Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 343.
Odontocephalus Conrad, 1840; 3d Rept. Pal. Dept. New York Geol. Survey, p. 204.
Hausmannia Hall, 1888; Pal. New York, vol. 7, p. xxxi.
Coronura Hall, 1888; Pal. New York, vol. 7, p. xxxii.
Corycephalus Hall, 1888; Pal. New York, vol. 7, p. xxxiv.

Dalmanites [*Asaphus?*] **acantholeurus** (Conrad) Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 113.

—— [*Asaphus?*] **acantholeurus** Conrad, 1841; 4th Rept. Pal. Dept. New York Geol. Survey, p. 48. Onondaga.

—— **acantholeurus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 19, fig. 14.

—— [*Dalmanites*] **acantholeurus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 19, fig. 14.

—— **achates** Billings, 1860; Canadian Naturalist, vol. 5, p. 63, fig. 9. Trenton.

—— **achates** Billings, 1863; Geol. Canada, p. 187, fig. 186.

—— **ægeria** Hall, 1861; Des. New Species Fossils, p. 57. Upper Helderberg.

—— **ægeria** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 85.

—— **ægeria** Hall, 1876; Illus. Devonian Foss. Crust., pl. 12, figs. 1, 2, 7.

—— **ægeria** Hall, 1876; Illus. Devonian Foss. Crust., p. 12, figs 3, 6, 8 (not figs. 1, 2, 7).

—— [*Odontocephalus*] **ægeria** Meek and Worthen, 1868; Geol. Illinois, vol. 3, p. 417, pl. 10, figs. 4 a, b, c.

—— [*Odontocephalus*] **ægeria** Hall, 1888; Pal. New York, vol. 7, p. 53, pl. 11 b, figs. 1-11.

—— [*Calymene*] **anchiops** Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 558. Upper Helderberg.

—— [*Calymene*] **anchiops** Green, 1832; Mon. Tril. N. A., p. 35, cast 7.

Syn., *Asaphus laticostatus* Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 559.
Asaphus laticostatus Green, 1832; Mon. Tril. N. A., p. 45, cast 13.

—— [*Phacops*] **anchiops** Burmeister, 1843; Org. Trilobiten, p. 90 (Ray Soc. edition).

—— [*Phacops*] **anchiops** Hall, 1851; Rept. Geol. Lake Superior Land Dist. (Foster and Whitney), pt. 2, p. 224, pl. 35, figs. 3 a, 3 b. (See **Dalmanites anchiops var. armatus.**)

—— [*Dalmania*] **anchiops** Hall, 1861; Des. New Species Fossils, p. 55.

—— [*Dalmania*] **anchiops** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 83.

—— **anchiops** Hall, 1876; Illus. Devonian Foss. Crust., p. 9, figs. 1, 3-6, 9, 10, 12, 13; pl. 10, figs. 6-14.

—— [*Chasmops*] **anchiops** Hall, 1888; Pal. New York, vol. 7, p. 59, pl. 9, figs. 1-6, 10, 12, 13; pl. 10, figs. 1-14.

—— [*Dalmania*] **anchiops** var. **armatus** Hall, 1861; Des. New Species Foss., p. 56.

—— [*Dalmania*] **anchiops** var. **armatus** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 84.

—— **anchiops** var. **armatus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 9, figs. 2, 7, 8.

—— [*Chasmops*] **anchiops** var. **armatus** Hall, 1888; Pal. New York, vol. 7, p. 62, pl. 9, figs. 7-9; pl. 10, fig. 14.

—— [*Chasmops*] **anchiops** var. **sobrinus** Hall, 1888; Pal. New York, vol. 17, p. 62, pl. 9, fig. 11.

—— [*Odontocephalus*] **arenarius** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 417, pl. 9, fig. 10. (See **Dalmanites selenurus.**)

—— [*Asaphus*] **aspectans** Conrad, 1841; 5th Ann. Rept. Pal. Dept. New York Geol. Survey, p. 48, fig. 9. Upper Helderberg.

Syn., *Asaphus? denticulatus* Conrad; *idem.*, p. 48.

Dalmanites [*Dalmania*] **aspectans** Hall, 1861; Des. New Species Foss., p. 60 (in error *D. adspectans*).

—— [*Dalmania*] **aspectans** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 88 (in error *D. adspectans*).

Syn., *Dalmania helena* Hall, 1861; Des. New Species Foss., p. 61.

Dalmania helena Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 89.

Dalmanites ohioensis Meek, 1871; Proc. Acad. Nat. Sci. Phila., p. 91.

Dalmanites ohioensis Meek, 1873; Pal. Ohio, vol. 1, p. 234, pl. 23, fig. 1.

Dalmanites denticulatus Hall, 1876; Illus. Devonian Foss. Crust., pl. 10, fig. 1.

—— **aspectans** Hall, 1876; Illus. Devonian Foss. Crust., pl. 13, figs. 6–8.

Syn., *helena* Hall, 1876; Illus. Devonian Foss. Crust., pl. 13, figs. 13, 14.

—— [*Coronura*] **aspectans** Hall, 1888; Pal. New York, vol. 7, p. 33, pl. 12, figs. 1–11, 13.

—— [*Cryphæus*] *barrisi* Hall. (See **Cryphæus barrisi** Hall.)

—— **bebryx** Billings, 1860; Canadian Naturalist, vol. 5, p. 62, fig. 8. Trenton.

—— **bebryx** Billings, 1863; Geol. Canada, p. 187, fig. 185.

—— [*Dalmania*] **bifida** Hall, 1861; Des. New Species Foss., p. 63. Upper Helderberg.

—— [*Dalmania*] **bifida** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 91.

—— [*Odontocephalus*] **bifida** Hall and Clarke, 1888; Pal. New York, vol. 7, p. 53, pl. 11 b, figs. 22–25.

Compare *Dalmanites ægeria* Hall.

—— [*Dalmania*] *boothi*. (See **Cryphæus boothi** Green.)

—— **bicornis** Hall, 1875; 28th Rept. New York State Mus. Nat. Hist. Expl., pl. 33, fig. 18. Niagara.

—— **bicornis** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 196, pl. 33, fig. 18.

—— **bicornis** Hall, 1882; 11th Ann. Rept. Geol. Nat. Hist. Indiana, 1881, p. 342, pl. 35, fig. 18.

—— **breviceps** Hall, 1866; 24th Rept. New York State Mus. Nat. Hist., p. 223, pl. 8, figs. 15, 16. Hudson.

—— **breviceps** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 143.

—— **breviceps** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 108, pl. 4, figs. 15, 16.

—— [*Phacops*] **callicephalus** Hall, 1847; Pal. New York, vol. 1, p. 247, pl. 65, figs. 3 a–3 i. Trenton.

—— [*Phacops*] **callicephalus** Hall, 1851; Rept. Geol. Lake Superior Land Dist. (Foster and Whitney), vol. 2, p. 212, pl. 3, figs. 3 a, 3 b.

—— [*Phacops*] **callicephalus** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 214, pl. 15, figs. 7, 7 a.

—— [*Dalmania*] *calliteles*. (See **Cryphæus calliteles**).

—— [*Dalmania*] **calypso** Hall, 1861; Des. New Species Foss., p. 61. Upper Helderberg.

—— [*Dalmania*] **calypso** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 89.

—— **calypso** Hall, 1876; Illus. Devonian Foss. Crust., pl. 13, figs. 1, 2.

—— [*Chasmops*] **calypso** Hall, 1888; Pal. New York, vol. 7, p. 4, pl. 16 a, fig. 1.

—— ? **cayahogoe** Claypole, 1884; Geol. Mag., vol. 1, p. 305, figure. Carboniferous.

—— ? **cayahogoe** Woodward, 1884; Mon. Brit. Carboniferous Tril., p. 79, figure.

—— **carleyi** Meek, 1872; Am. Jour. Sci., 3d series, vol. 3, p. 424. Hudson.

—— **carleyi** Meek, 1873; Pal. Ohio, vol. 1, p. 170, pl. 14, figs. 2 a–2 d.

—— **carleyi** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 142.

—— [*Dalmania*] *caudata* (Brong.) Roemer. (See **Dalmanites limulurus** Green.)

Dalmanites [*Cryphæus*] *comis*. (See **Cryphæus comis** Hall.)

—— **concinnus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 10, figs. 3–5. Schoharie.

—— [*Hausmannia*] **concinnus** Hall, 1888; Pal. New York, vol. 7, p. 30, pl. 11 a, figs. 9–11.

—— [*Hausmannia*] **concinnus** var. **serrula** Hall and Clarke, 1888; Pal. New York, vol. 7, p. 30, pl. 11 a, fig. 12.

—— [*Dalmania*] **coronatus** Hall, 1861; Des. New Species Foss., p. 58.
Upper Helderberg.

—— [*Dalmania*] **coronatus** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 86.

—— **coronatus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 12, figs. 15–17; pl. 13, fig. 5.

—— [*Odontocephalus?*] **coronatus** Hall, 1888; Pal. New York, vol. 7, p. 54, pl. 11 b, figs. 12–14.

—— **danæ** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., p. 264. Niagara.

—— **danæ** Meek and Worthen, 1868; Pal. Illinois, vol. 3, p. 363, pl. 6, figs. 1 a–1 f.

—— **dentata** Barrett, 1876; Am. Jour. Sci., 3d series, vol. 11, p. 200, plate.
Lower Helderberg.

—— **dentata** Barrett, 1876; Am. Jour. Sci., 3d series, vol. 12, p. 70.

—— [*Corycephalus*] **dentatus** Hall and Clarke, 1888; Pal. New York, vol. 7, p. 58, pl. 11 a, figs. 4–6.

—— [*Asaphus?*] **denticulatus** Conrad, 1841; 5th Rept. Pal. Dept. New York Geol. Survey, p. 48.
Lower Helderberg.

—— **denticulatus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 10, fig. 1.

—— [*Phæton*] **denticulatus** Meek, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 49, pl. 1, figs. 10 a, b.

—— **emarginatus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 10, fig. 2.
Upper Helderberg.

—— [*Coronura*] **emarginatus** Hall, 1888; Pal. New York, vol. 7, p. 40, pl. 11 a, figs. 7, 8.

—— **epicrates** Billings, 1863; Proc. Portland Soc. Nat. Hist., vol. 1, p. 119, pl. 1, fig. 21.

—— [*Dalmania*] **erina** Hall, 1861; Des. New Species Foss., p. 62.
Upper Helderberg.

—— [*Dalmania*] **erina** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 90.

—— **erina** Hall, 1876; Illus. Devonian Foss. Crust., pl. 13, figs. 3, 4.

—— [*Chasmops*] **erina** Hall, 1888; Pal. New York, vol. 7, p. 67, pl. 11, figs. 16–18.
Upper Silurian.

—— [*Dalmania*] *helena*. (See **Dalmanites aspectans.**)

—— **intermedius** Walcott, 1877; Advance sheets 31st Rept. New York State Cab. Nat. Hist., p. 17. Trenton.

—— **intermedius** Walcott, 1879; 31st Rept. New York State Cab. Nat. Hist., p. 69.

—— [*Phacops?*] **laticauda** Hall, 1847; Pal. New York, vol. 1, p. 248, pl. 64, fig. 3.

—— [*Asaphus*] **limulurus** Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 559.
Niagara.

—— [*Asaphus*] **limulurus** Green, 1832; Mon. Tril. N. A., p. 48, cast 16.

—— [*Phacops*] **limulurus** Hall, 1852; Pal. New York, vol. 2, p. 303, pl. 67, figs. 1–8.
Syn. [*Dalmania*] *caudata* (Brong.) Roemer, 1860; Die sil. Fauna W. Tenn., p. 82, pl. 5, fig. 21.

—— [*Dalmania*] **logani** Hall, 1860; Canadian Naturalist, vol. 5, p. 156, fig. 18.
Silurian.

—— [*Dalmania*] **macrops** Hall, 1861; Des. New Species Foss., p. 59.
Upper Helderberg.

—— [*Dalmania*] **macrops** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 87.

Dalmanites macrops, 1876; Illus. Devonian Foss. Crust., pl. 13, figs. 9, 10.

—— [*Chasmops*] **macrops** Hall, 1888; Pal. New York, vol. 7, p. 68, pl. 11 a, figs. 14, 15.

—— **macroura**? (Sjogr.) Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 61.

—— [*Dalmania*] **meta** Hall, 1862; Geol. Wisconsin, vol. 1, p. 433.

—— **meeki** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 207, pl. 17, figs. 5–5 a, b (not fig. 5 c).

—— **(undetermined sp.)** Meek, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 48, pl. 1, figs. 11, 11 a.

—— [*Hausmannia*] **meeki** Hall, 1888; Pal. New York, vol. 7, p. 11 a, figs. 28–30.

—— [*Asaphus*] **micrurus** Green, 1832; Monthly Am. Jour. Geology, p. 559, pl. 14, fig. 3. Lower Helderberg.

—— [*Asaphus*] **micrurus** Green, 1832; Mon. Tril. N. A., p. 56, cast 19, pl., fig. 3.

—— [*Dalmania*] **micrurus** Hall, 1859; Pal. New York, vol. 3, p. 359, pl. 75, figs. 13–18.

—— [*Asaphus*] **myrmecophorus** Green, 1835; Am. Jour. Sci., 1st series, vol. 23, p. 397. Upper Helderberg.

—— [*Asaphus*] **myrmecophorus** Green, 1835; Suppl. Mon. Tril. N. A., p. 16, cast 40.

—— [*Dalmania*] **myrmecophorus** Hall, 1861; Des. New Species Foss., p. 60.

—— [*Dalmania*] **myrmecophorus** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 88.

—— **myrmecophorus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 13, figs. 15, 16.

—— [*Coronura*] **myrmecophorus** Hall, 1888; Pal. New York, vol. 7, p. 37, pl. 11 a, fig. 13; pl. 13, fig. 12; pl. 14, figs. 1–6; pl. 15, figs. 1–4.

—— [*Asaphus*] **nasutus** Conrad, 1841; 5th Rept. Pal. Dept. New York Geol. Survey, p. 48. Lower Helderberg.

—— [*Dalmania*] **nasutus** Hall, 1859; Pal. New York, vol. 3, p. 362, pl. 75, fig. 2; pl. 76, figs. 1–9.

—— [*Dalmanites*] *ohioensis*. (See **Dalmanites aspectans**.)

—— [*Hausmannia*] **phacoptyx** Hall, 1888; Pal. New York, vol. 7, p. 31, pl. 11 a, figs. 23–29. Upper Helderberg.

—— [*Dalmania*] *pleione*. (See **Cryphæus pleione**.)

—— [*Asaphus*] **pleuropteryx** Green, 1832; Monthly Jour. Geol., vol. 1, p. 559. Lower Helderberg.

—— [*Asaphus*] **pleuropteryx** Green, 1832; Mon. Tril. N. A., p. 55, cast 18.

—— [*Dalmania*] **pleuropteryx** Hall, 1859; Pal. New York, vol. 3, p. 356, pl. 74, figs. 5(?) 9(?) (not figs. 1–4, 6–8, 10–12), pl. 75, fig. 1.

—— [*Hausmannia*] **pleuropteryx** Hall, 1888; Pal. New York, vol. 7, p. 28, pl. 9, figs. 1–3.

—— [*Corycephalus*] **pygmæus** Hall, 1888; Pal. New York, vol. 7, p. 56, pl. 11, figs. 5–8. Upper Helderberg.

—— **regalis** Hall, 1876; Illus. Devonian Foss. Crust., pl. 11, figs. 1–4. Upper Helderberg.

—— [*Corycephalus*] **regalis** Hall, 1888; Pal New York, vol. 7, p. 55, pl. 11, figs. 1–4.

—— [*Asaphus*] **selenurus** Eaton, 1832; Geological Text Book, p. 31, pl. 1, fig. 1. Upper Helderberg.

—— [*Asaphus*] **selenurus** Green, 1832; Mon. Tril. N. A., p. 46, casts 14 and 15.

Syn., *Calymene? odontocephala* Green, 1835; Suppl. Mon. Tril. N. A., p. 9, cast 36.
Calymene? odontocephala Green, 1835; Am. Jour. Sci., 1st series, vol. 25, p. 334.

—— [*Odontocephalus*] **selenurus** Conrad, 1840; 3d Rept. Pal. Dept. New York Geol. Survey, p. 204.

—— [*Odontocephalus*] **selenurus** Vanuxem, 1842; Geol. New York, 3d Geol. Dist., pp. 139, 140, fig. 1.

—— [*Odontocephalus*] **selenurus** Hall, 1843; Geol. New York, 4th Geol. Dist., p. 175, fig. 1.

Dalmanites [*Dalmania*] **selenurus** Hall, 1859; 12th Rept. New York State Cab. Nat. Hist., p. 88.

—— [*Dalmania*] **selenurus** Hall, 1861; Des. New Species Foss., p. 56.

—— [*Dalmania*] **selenurus** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 84.

Syn., *Odontocephalus?* (*Dalmanites-Odontocephalus*) *arenarius* Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 416, pl. 9, fig. 10.

—— **selenurus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 12, figs. 12–14.

—— [*Odontocephalus*] **selenurus** Hall, 1888; Pal. New York, vol. 7, p. 49, pl. 11 b, figs. 15–21; pl. 12, figs. 1–13.

—— [*Dalmania*] **tridens** Hall, 1859; Pal. New York, vol. 3, p. 361, pl. 75, figs. 3–6. Lower Helderberg.

—— [*Dalmania*] **tridentifera** Shumard, 1855; 1st and 2d Geol. Repts. Missouri, p. 199, pl. B, figs. 8 a–c. Lower Helderberg.

—— **tridentifera** Meek and Worthen, 1868; Pal. Illinois, vol. 3, p. 391, pl. 7, fig. 16.

—— *troosti* Safford, 1869; Geol. Tennessee, p. 290. (See **Chasmops troosti** Safford.) Nashville.

—— [*Dalmania*] **verrucosus** Hall, 1863; Trans. Albany Inst., vol. 4, p. 218. (Abstract published May, 1863, p. 24.) Niagara.

—— **verrucosus** Hall, 1875; 28th Rept. New York State Mus. Nat. Hist., pl. 23, figs. 5–17, 13–15. Museum ed., 1879, p. 195, pl. 23, fig. 5–17; pl. 34, figs. 13–15.

—— **verrucosus** Hall, 1882; 11th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, p. 341, pl. 35, figs. 5–17; pl. 36, figs. 13–15.

—— **vigilans** Hall, 1861; Rept. Progress Wisconsin Geol. Survey, p. 51. Niagara.

—— [*Dalmania*] **vigilans** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 335, pl. 21, figs. 16–18.

—— [*Dalmania*] **vigilans** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist. (2d ed.), p. 426, pl. 21, figs. 16–18.

—— **vigilans** Hall, 1875; 28th Rept. New York State Mus. Nat. Hist. Expl., pl. 33, figs. 1–4.

—— **vigilans** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist. (Mus. ed.), p. 193, pl. 33, figs. 1–4.

—— **vigilans** Hall, 1882; 11th Ann. Rept. Geol. Nat. Hist. Indiana, 1881, p. 339, pl. 35, figs. 1–4; pl. 33, fig. 9.

—— **werthneri** Foerste, 1885; Bull. Denison Univ., vol. 1, p. 116. Clinton.

—— **werthneri** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 109, pl. 8, figs. 22–25.

Dicellocephalus. (See **Dikelocephalus.**)

Dikelocephalus Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 573.

Type, *Dikelocephalus minnesotensis* Owen.

Syn., *Centropleura* Angelin, 1854; Pal. Scand., p. 87, pl. 41, figs. 9–11.

This generic term has sometimes been spelled *Dicellocephalus.*

—— **affinis** Billings, 1865; Pal. Foss., vol. 1, p. 197, fig. 183 a, b. Quebec,

—— ? **angustifrons** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8. p. 42, pl. 10, figs. 1, 1 a, b. Cambrian.

—— **belli** Billings, 1860; Canadian Naturalist, vol. 5, p. 311, fig. 7. Quebec.

—— **belli** Billings, 1865; Pal. Foss., vol. 1, p. 403, fig. 378.

—— **barabuensis** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 63. Lower Magnesian.

—— **barabuensis** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 201, pl. 4, figs. 6–9.

Compare *Bathyurus capax* Billings.

—— **bilobatus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., p. 226, pl. 2, fig. 36. Potsdam.

—— **bilobatus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 40.

Dikelocephalus crassimarginatus Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 344, pl. 27, fig. 14. Potsdam.

Syn., *pepinensis* (Hall), 16th Rept. New York State Cab. Nat. Hist. Expl., pl. 11. fig. 2.

——? **corax** Billings, 1865; Pal. Foss., vol. 1, p. 344, figs. 322 a, b. Quebec.

Referred to *Olenoides? corax* Walcott, 1884; Bull. U. S. Geol. Survey, No. 30, p. 184.

—— **cristatus** Billings, 1860; Canadian Naturalist, vol. 5, p. 312, fig. 10. Quebec.

—— **cristatus** Billings, 1865; Pal. Foss., vol. 1, p. 404, fig. 384.

This species might be referred to the genus *Dorypyge*.

—— **devinei** Billings, 1865; Pal. Foss., vol. 1, p. 195, figs. 180, 181. Quebec.

—— **eatoni** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 65. Lower Magnesian.

—— **eatoni** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 202, pl. 4, figs. 11–17; pl. 10, figs. 4, 5.

——? **expansus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 89, pl. 9, fig. 19. Cambrian.

—— **finalis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 89, pl. 12, figs. 12 a, b. Pogonip.

—— **flabellifer** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 227, pl. 2, figs. 29, 30. Potsdam.

—— *flagricaudus* White. (See **Olenoides ? flagricauda.**)

—— *? gothicus* Hall and Whitfield. (See **Dorypyge gothicus.**)

—— **hisingeri** Billings, 1865; Pal. Foss., vol. 1, p. 196, fig. 182. Quebec.

—— **inexpectans** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 90, pl. 1, fig. 10. Pogonip.

—— *? iowensis* Owen. (See **Crepicephalus iowensis** (Owen) Walcott.)

—— **iole** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 43, pl. 10, fig. 19. Cambrian.

—— **latifrons** Shumard, 1863; Trans. Acad. Sci. St. Louis, vol. 2, p. 101. Potsdam.

—— **lodensis** Whitfield, 1880; Ann. Rept. Geol. Survey Wisconsin, 1879, p. 51. Potsdam.

—— **lodensis** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 188, pl. 10, fig. 14; p. 341, pl. 27, figs. 12, 13.

—— **magnificus** Billings, 1860; Canadian Naturalist, vol. 5, p. 307, fig. 5 (*Remopleurides magnificus* Billings, 1865; Pal. Foss., vol. 1, p. 294). Quebec.

—— **magnificus** Billings, 1865; Pal. Foss., vol. 1, p. 399, fig. 376.

——? **marcoui** Whitfield, 1884; Bull. Am. Mus. Nat. Hist. New York, vol. 1, p. 150, pl. 14, fig. 7. Potsdam.

Referred to **Olenoides marcoui** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 186, pl. 26, figs. 5, 5 a, b.

—— **marica** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 44, pl. 10, fig. 13. Cambrian.

—— **megalop** Billings, 1860; Canadian Naturalist, vol. 5, p. 311, fig. 9. Quebec.

—— **megalop** Billings, 1865; Pal. Foss., vol. 1, p. 403, fig. 380.

—— *miniscaensis*. (See **Ptychaspis miniscaensis.**)

—— **minnesotensis** Owen. Cambrian.

A very large sp. *Asaphus* Owen, 1848; Rept. Geol. Reconnoissance Chippewa Land Dis., p. 15, pl. 7, figs. 2, 3.

—— **minnesotensis** Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 574, pl. 1, figs. 2, 10; pl. 10, figs. 3, 6.

—— **minnesotensis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 138, pl. 9, figs. 5–10; pl. 10, figs. 10–12; pl. 11, figs. 1–4, 6.

Dikelocephalus minnesotensis var. **limbatus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 141, pl. 9, fig. 12.

—— **minnesotensis** var. Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 141, pl. 9, fig. 11; pl. 10, fig. 9.

—— **minnesotensis** Winchell, 1864; Am. Jour. Sci., 2d series, vol. 37, p. 229.

—— **minnesotensis** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 187, pl. 3, fig. 1.

—— **misa** Hall, 1863; 16th Rept. State Cab. Nat. Hist., p. 144, pl. 8, fig. 15; pl. 10, figs. 4–8. **Potsdam.**

—— **missisquoi** Billings, 1865; Pal. Foss., vol. 1, p. 199. **Quebec.**

—— **multicinctus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 226, pl. 2, fig. 37. **Potsdam.**

—— **nasutus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 40, pl. 10, fig. 15. **Cambrian.**

—— **osceola** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 146, pl. 7, fig. 49; pl. 10, fig. 18. **Potsdam.**

—— **osceola** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 40, pl. 9, fig. 25.

—— **oweni** Billings, 1860; Canadian Naturalist, vol. 5, p. 310, fig. 8. **Quebec.**

—— **oweni** Billings, 1865; Pal. Foss., vol. 1, p. 402, fig. 379.

—— **pauper** Billings, 1865; Pal. Foss., vol. 1, p. 200. **Quebec.**

—— **pepinensis** Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 574, pl. 1, figs. 9, 9 a; pl. 1 a, fig. 7. **Potsdam.**

—— **pepinensis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 142, pl. 9, figs. 1–4; pl. 10, figs. 13–17. (Expl., pl. 11, fig. 2. See **Dicellocephalus crassimarginatus.**)

—— **pepinensis** Winchell, 1864; Am. Jour. Sci., 2d series, vol. 37, p. 229.

—— **planifrons** Billings, 1860; Canadian Naturalist, vol. 5, p. 309, fig. 6. **Quebec.**

—— **planifrons** Billings, 1865; Pal. Foss., vol. 1, p. 401, fig. 377.

—— *quadriceps*. (See **Dorypyge quadriceps.**)

—— **richmondensis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 41, pl. 10, fig. 7. **Cambrian.**

—— **roemeri** Shumard, 1861; Am. Jour. Sci., 2d series, vol. 32, p. 220. **Potsdam.**

—— **selectus** Billings, 1865; Pal. Foss., vol. 1, p. 199. **Quebec.**

—— **selectus** Billings, 1865; Pal. Foss., vol. 1, p. 198. (See **Ptychaspis selectus.**)

—— **spiniger** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 143, pl. 10, figs. 1, 2, 3 (?). **Potsdam.**

—— *wahsatchensis*. (See **Olenoides wahsatchensis.**)

Dionide Barrande, 1847; Neues Jahrbuch für Mineral., vol. 4, p. 391.

Type, *Dionide formosa* Barrande.

Syn., *Dione* Barrande; Notice Prélim. Sil. Syst. Bohême, p. 33.

Polytomurus Corda, 1847; Prodr., p. 153.

—— ? **perplexa** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 67.

Dipleura Green, 1832; Mon. Tril. North America, p. 79. (See **Homalonotus dekayi.**)

Discranurus Conrad, 1841; 5th Rept. Pal. Dept. New York Geol. Survey, p. 48. (See **Acidaspis hamata.**)

Dolichometopus Angelin, 1854; Palæont. Scand., p. 72.

Type, *Dolichometopus svecicus* Ang.

—— ? **convexus** Billings, 1865; Pal. Foss., vol. 1, p. 269, fig. 253. **Quebec.**

—— ? **gibberrulus** Billings, 1865; Pal. Foss., vol. 1, p. 269, fig. 254. **Quebec.**

—— ? **rarus** Billings, 1865; Pal. Foss., vol. 1, p. 352, fig. 308. **Quebec.**

Dorypyge Dames, 1884; China (Richthofen), vol. 4, p. 23.

Type, *Dorypyge richthofeni* Dames.

—— [*Dikelocephalus*] **cristatus** Billings, 1865; Pal. Foss., vol. 1, p. 404, fig. 384. **Cambrian.**

Dorypyge [*Dikelocephalus?*] **gothicus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 242, pl. 1, fig. 36. Potsdam.

—— **gothicus** Dames, 1884; China (Richthofen), vol. 4, p. 23.

—— [*Dicellocephalus?*] **gothicus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 45, pl. 9, fig. 24. Referred to

—— [*Olenoides*] **gothicus** Walcott, 1886; Bull. U. S. Geol. Survey, vol. 30, p. 187, pl. 29, figs. 1, 1 a–c.

—— [*Dikelocephalus*] **quadriceps** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 240, pl. 1, figs. 37–40. Cambrian.

—— [*Dicellocephalus*] **quadriceps** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 45, pl. 9, fig. 24.

—— **quadriceps** Dames, 1884; China (Richthofen), vol. 4, p. 23. Referred to

—— [*Olenoides*] **quadriceps** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 187, pl. 29, figs. 1, 1 a–c.

Dysplanus Burmeister, 1843; Organization of Trilobites (Ray Soc. ed., p. 205).
Type, ***Dysplanus centrotus*** Dalman.

Ellipsocephalus Zenker, 1833; Beiträge Naturgeschichte der Urwelt, p. 51.
Type, ***Ellipsocephalus hoffi*** Bronn.

—— **curtus** Whitfield, 1878; Ann. Rept. Geol. Wisconsin, 1877, p. 58. Potsdam.

—— **curtus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 191, pl. 1, fig. 18.

Eliptocephalus Emmons, 1844; Taconic Syst., p. 21, figs. 1–3.

—— ***asaphoides.*** (See **Olenellus asaphoides** Emmons.)

Embolimus Rominger, 1887; Proc. Acad. Nat. Sci. Phila., p. 16. (See **Zacanthoides** Walcott.)

—— ***rotundata.*** (See **Bathyuriscus howelli.**)

—— ***spinosa.*** (See **Olenoides spinosus.**)

Encrinurus Emmrich, 1844; Zur Naturg. Trilobiten, p. 16.
Type, ***Encrinurus punctatus*** Brünnich.

—— **americanus** Vogdes, 1886; Des. New Crust. Clinton Group Georgia, p. 1. Clinton.

—— **americanus** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 102.

—— **deltoideus** Shumard, 1855; Geol. Missouri, p. 198, pl. B, fig. 10. Upper Silurian.

—— [*Cryptonymus*] **deltoideus** Vogdes, 1878; Mon. Genera Zethus, etc., p. 21.

—— **deltoideus** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 102.

—— **egani** Miller, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 254, pl. 15, figs. 1, 1 a, b. Niagara.

—— **elegantulus** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 62.

—— **elegantulus** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 102.

—— ***excedrensis*** Safford. (See **Encrinurus varicostatus** Walcott.)
Syn., ***excedrensis*** Safford, 1869; Geol. Tennessee, p. 290.

—— **mirus** Billings, 1865; Pal. Foss., vol. 1, p. 292, fig. 282. Quebec.

—— [*Cryptonymus*] **mirus** Vogdes, 1878; Mon. Genera Zethus, etc., p. 34.

—— [*Amphion*] **multisegmentatus** Portlock, 1843; Geol. Londonderry, etc., p. 291, pl. 3, fig. 6.

—— **multisegmentatus** Salter; Mem. Geol. Survey United Kingdom, decade 7, pl. 4.

—— **multisegmentatus** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 61.

—— [*Cryptonymus*] **multisegmentatus** Vogdes, 1878; Mon. Genera Zethus, etc., p. 29.

—— **nereus** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 375, pl. 21, fig. 15. Niagara.

—— **nereus** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 425, pl. 21, fig. 15.

—— [*Cryptonymus*] **nereus** Vogdes, 1878; Mon. Genera Zethus, etc., p. 24, pl. 3, fig. 17.

—— **ornatus** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 154, pl. 7, fig. 16. Niagara.
Syn., ***Cybele punctata*** Hall, 1852; Pal. New York, vol. 2, p. 297, pl. A 66, figs. 1 a

Encrinurus [*Cryptonymus*] **ornatus** Vogdes, 1878; Mon. Genera Zethus, etc., p. 23.

—— **ornatus** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 102.

—— **punctatus** (Brünnich) Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 61.

—— **thresheri** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 101, pl. 8, fig. 26. Clinton.

—— **trentonensis** Walcott, 1877; Advance sheets 31st Rept. New York State Mus. Nat. Hist., p. 15. Trenton.

—— **trentonensis** Walcott, 1879; 31st Rept. New York State Mus. Nat. Hist., p. 68.

—— [*Cryptonymus*] **trentonensis** Vogdes, 1878; Mon. Genera Zethus, etc., p. 28.

—— **varicostatus** Walcott, 1877; Advance sheets 31st Rept. New York State Mus. Nat. Hist., p. 16. Trenton.

—— **varicostatus** Walcott, 1879; 31st Rept. New York State Cab. Nat. Hist., p. 69.

—— [*Cryptonymus*] **varicostatus** Vogdes, 1878; Mon. Genera Zethus, etc., p. 27.

—— **varicostatus** Safford and Vogdes, 1889; Proc. Acad. Nat. Sci. Phila., p. 167, figure.

—— [*Ceraurus*] **vigilans** Hall, 1847; Pal. New York, vol. 1, p. 245, pl. 65, figs. 2 a–2 h. Trenton.

—— [*Ceraurus*] **vigilans** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 217, pl. 15, figs. 2 a–2 c.

—— [*Cryptonymus*] **vigilans** Vogdes, 1878; Mon. Genera Zethus, etc., p. 29, pl. 2, figs. 2 a–2 h.

Endymion Billings, 1862; Pal. Foss., vol. 1, p. 94. Changed by author to **Endymionia.**

Endymionia Billings, 1865; Pal. Foss., vol. 1, p. 281.

—— **meeki** Billings, 1862; Pal. Foss., vol. 1, pp. 94 and 281, fig. 84. Quebec.

Griffithides Portlock, 1843; Geol. Rept. Londonderry, etc., p. 310.
Type, *Griffithides longiceps* Portlock.

—— [*Phillipsia* (*Griffithides*)] **bufo** Meek and Worthen, 1870; Proc. Acad. Nat. Sci. Phila., p. 52. Keokuk.

—— [*Phillipsia* (*Griffithides*)] **bufo** Meek and Worthen, 1873; Geol. Survey Illinois, vol. 5, p. 528, pl. 19, fig. 5.

—— **bufo** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 95, pl. 3, figs. 4, 5, 10.

—— [*Proetus*] **granulatus** Wetherby, 1881; Jour. Cincinnati Soc. Nat. Hist., vol. 4, p. 31, pl. 2, figs. 8, 8 a, 9, 9 a. Chester.

—— **granulatus** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 101.

—— [*Phillipsia* (*Griffithides ?*)] *lodiensis* Meek. (See **Brachymetopsis lodiensis.**)

—— [*Phillipsia* (*Griffithides*)] **portlocki** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., p. 268. Keokuk.

—— [*Phillipsia* (*Griffithides*)] **portlocki** Meek and Worthen, 1873; Geol. Survey Illinois, vol. 5, p. 525, pl. 19, fig. 6.

—— **portlocki** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 266, pl. 24, figs. 4, 4 a, b.

—— **portlocki** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 93, pl. 3, fig. 9.

—— [*Phillipsia* (*Griffithides ?*)] **sangamonensis** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., p. 270. Coal Measures.

—— [*Phillipsia* (*Griffithides ?*)] **sangamonensis** Meek and Worthen, 1873; Geol. Survey Illinois, vol. 5, p. 615, pl. 32, fig. 4.

—— [*Phillipsia* (*Griffithides ?*)] **sangamonensis** White, 1883; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 174, pl. 39, figs. 4, 5.

—— [*Phillipsia*] **sangamonensis** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 61, pl. 5, fig. 13.

—— [*Griffithides*] **sangamonensis** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 99, pl. 3, figs. 7, 8.

—— [*Phillipsia* (*Griffithides*)] **scitula** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., p. 270. Coal Measures.

Griffithides [*Phillipsia* (*Griffithides*)] **scitula** Meek and Worthen, 1873; Geol. Survey Illinois, vol. 5, p. 612, pl. 32, fig. 3.

—— [*Phillipsia* (*Griffithides*)] **scitula** White, 1883; 13th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, 1882, p. 173, pl. 39, figs. 6–9.

—— [*Phillipsia*] **scitula** Meek, 1872; U. S. Geol. Survey Territories, Final Rept. Nebraska, p. 238, pl. 6, fig. 9.

—— [*Phillipsia*] **scitula** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 62.

—— **scitula** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 97, pl. 2, figs. 11–13.

—— ? **sedaliensis** Vogdes, 1888; Trans. New York Acad. Sci., vol. 7, p. 249. Waverly.

—— [*Phæthonides?*] **sedaliensis** Herrick, 1889; Bull. Denison Univ., vol. 3, p. 57.

Harpes Goldfuss, 1839; Nova Acta Acad. Leop. Carol., vol. 19, p. 358.

Type, *Harpes ungula* Sternb.

—— **antiquatus** Billings, 1859; Canadian Naturalist, vol. 4, p. 469, fig. 38. Chazy.

—— **antiquatus** Billings, 1863; Geol. Canada, p. 133, fig. 67.

—— **consuetus** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 64.

—— **dentoni** Billings, 1863; Canadian Naturalist, vol. 8, p. 36, figure. Trenton.

—— **dentoni** Billings, 1865; Pal. Foss., vol. 1, p. 183, fig. 166.

—— **ecanabiæ** Hall, 1851; Rept. Geol. Lake Superior Land Dist. (Foster and Whitney), pt. 2, p. 211, pl. 27, fig. 2 a. Trenton.

—— **granti** Billings, 1865; Pal. Foss., vol. 1, p. 326, fig. 314.

—— **ottawensis** Billings, 1865; Pal. Foss., vol. 1, p. 182, fig. 165. Trenton.

Harpides Beyrich, 1846; Untersuch. Trilobiten, p. 34.

—— **atlanticus** Billings, 1865; Pal. Foss., vol. 1, p. 281, fig. 267. Quebec.

—— **concentricus** Billings, 1865; Pal. Foss., vol. 1, p. 282, fig. 268. Quebec.

—— ? **desertus** Billings, 1865; Pal. Foss., vol. 1, p. 333, fig. 321. Quebec.

Hausmannia Hall, 1888; Pal. New York, vol. 7, p. xxxi. (Subgenus, see **Dalmanites.**)

Hemicrypturus Green, 1832; Mon. Tril. N. A., p. 20.

—— *clintoni.* (See **Calymene clintoni** Vanuxem.)

Holometopus Angelin, 1854; Palæont. Scand., p. 58.

Type, *Holometopus aciculatus*, pl. 33, fig. 5.

—— **angelini** Billings, 1862; Pal. Foss., vol. 1, p. 95, fig. 85; also p. 281. Quebec.

Homalonotus Koenig, 1820; Icones Foss. Sectiles, p. 4.

Type, *Homalonotus knighti* Koenig, pl. 7, fig. 85.

Syn., *Brongniartia* Eaton, 1832; Geological Text Book, p. 32, pl. 2, fig. 20 (in part).

Dipleura Green, 1832; Mon. Tril. N. A., p. 78; Monthly Am. Jour. Geology, p. 560.

Trimerus Green, 1832; Mon. Tril. N. A., p. 81; Monthly Am. Jour. Geology, p. 560.

Plœsiacomia Corda, 1847; Prodr., p. 171.

Brogniartia Salter, 1865; Mon. Brit. Tril., p. 104 (subgenus).

Burmeisteria Salter, 1865; Mon. Brit. Tril., p. 105 (subgenus).

Koenigia Salter, 1865; Mon. Brit. Tril., p. 104 (subgenus).

—— [*Asaphus*] *cornigerus* (Schlotheim) Brong., 1822; Crust. Foss., p. 18, pl. 4, fig. 10 (not pl. 2, fig. 1).

—— [*Asaphus*] **crypturus** Green, 1834; Trans. Geol. Soc. Pennsylvania, vol. 1, p. 37, pl. 4. Devonian.

—— [*Asaphus?*] **crypturus** Green, 1835; Suppl. Mon. Tril. N. A., p. 18, cast 41.

Syn., *Asaphus ditmarsiæ* Honeyman, 1879; Proc. Nova Scotia Inst., vol. 5, p. 18.

—— [*Asaphus?*] **crypturus** Honeyman, 1888; Proc. Nova Scotia Inst., vol. 7, pt. 1, p. 63.

—— **dawsoni** Hall, 1860; Canadian Naturalist, vol. 5, p. 155. Silurian.

Homalonotus dawsoni Dawson, 1878; Acadian Geology (3d ed.), p. 606, fig. 214.

—— [*Dipleura*] **dekayi** Green, 1832; Mon. Tril. N. A., p. 79, casts 30, 31, pl. 1, figs. 8, 9.
Hamilton.

Syn., *Nuttainia sparsa* Eaton, 1832; Geological Text Book, p. 34.
Nuttainia sparsa Green, 1832; Mon. Tril. N. A., p. 89, cast 35.

—— [*Dipleura*] **dekayi** Vanuxem, 1842; Geol. New York, 3d Geol. Dist., p. 150, fig. 1.

—— [*Dipleura*] **dekayi** Hall, 1843; Geol. New York, 4th Geol. Dist., p. 205, fig. 1

—— **dekayi** Emmons, 1860; Manual Geology, pp. 146, 147, figs. 134, 135.

—— **dekayi** Hall, 1861; Des. New Species Foss, p. 85.

—— **dekayi** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 113.

—— **dekayi** Hall, 1877; Illus. Devonian Foss. Crust., pls. 2–5.

—— **dekayi** Hall, 1888; Pal. New York, vol. 7, p. 7, pl. 2, figs. 1–12; pl. 3, figs. 1–5; pl. 4, figs. 1–7; pl. 5, figs. 1–4.

—— [*Trimerus*] **delphinocephalus** Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 559, pl. 0, fig. 1.
Niagara.

—— [*Trimerus*] **delphinocephalus** Green, 1832; Mon. Tril. N. A., p. 82, pl. 1, fig. 1, cast 32.

—— [*Trimerus*] **delphinocephalus** Harlan, 1835; Trans. Geol. Soc. Pennsylvania, vol. 1, p. 105.

Syn., *Brongniartia platycephala* Eaton, 1832; Geol. Text Book, p. 32, pl. 2, fig. 20.
Brongniartia platycephala Green, 1832; Mon. Tril. N. A., p. 91.
Ogygies latisima Eaton, 1832; Am. Jour. Sci., 1st series, vol. 21, p. 136 (footnote).

—— **delphinocephalus** Murchison, 1839; Sil. Syst., p. 651, pl. 7 *bis*, figs. 1 a, 1 b.

Syn., *Ahrendii* Roemer, 1843; Verst. Harzzebirges, p. 39, pl. 11, fig. 5.

—— **delphinocephalus** Hall, 1843; Geol. New York, 4th Geol. Dist., p. 103, fig. 34.

—— **delphinocephalus** Verneuil, Note sur la parallélisme, etc., p. 47.

Syn., *atlas* Castelnau, 1843; Syst. Sil. de l'Amér., p. 20.
giganteus Castelnau, 1843; Syst. Sil. de l'Amér.
herculaneus Castelnau, 1843; *idem.*

—— **delphinocephalus** Hall, 1852; Pal. New York, vol. 2, p. 309, pl. 68, figs. 1–14.

—— **delphinocephalus** Salter, 1865; Mon. Brit. Tril., p. 113, pl. 11, figs. 1–10.

—— **delphinocephalus** Hall, 1883; 12th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, 1882, p. 332, pl. 34, figs. 17, 18.

—— **delphinocephalus ?** Hall, 1875; 28th Rept. New York State Mus. Nat. Hist., pl. 34, figs. 17, 18.

—— **delphinocephalus** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 187, pl. 32, figs. 17, 18.

—— [*Trimerus*] **jacksoni** Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 347.
Devonian.

—— **major** Whitfield, 1885; Bull. Am. Mus. Nat. Hist., vol. 1, No. 6, p. 193, pl. 22.
Oriskany.

—— **major** Hall, 1888; Pal. New York, vol. 7, p. 4, pl. 5 a, fig. 1.

—— **vanuxemi** Hall, 1859; Pal. New York, vol. 3, p. 352, pl. 73, figs. 9–14.
Lower Helderberg.

—— **vanuxemi** Hall, 1888; Pal. New York, vol. 7, p. 11, pl. 5 b, figs. 1, 2.

Hopolichas Dames, 1877; Zeitschr. Deutsch. geol. Gesell., 1872, p. 794.
Type, *Lichas* (*Hopolichas*) *tricuspidata* Beyrich.

Illænurus Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 176.
Type, *Illænurus quadratus* Hall.

—— **convexus** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 66.
Lower Magnesian.

—— **convexus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 203, pl. 4, figs. 3–5.

—— **eurekensis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 97, pl. 12, figs. 4, 4 a.
Pogonip.

Illænurus quadratus Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 176, pl. 7, figs. 52–57. Potsdam.

Illænus Dalman, 1826; Palæad., p. 50.

Type, *Illænus crassicauda*, Wahl., Nova Acta Soc. Scient. Upsal., vol. 8, p. 8, pl. 2, figs. 5, 6 (not pl. 7, figs. 5, 6, *Illænus esmarki*).

Syn., *Actinolobus* Eichwald, 1860.
Alceste Corda, 1847.
Cryptonymus Eichwald, 1825 (in part), not *Cryptonymus* Eichwald, 1840.
Deucalion Stochegloff, 1827.
Ectillænus Salter, 1866 (subgenus).
Hydrolænus Salter, 1866 (subgenus).
Illænopsis Salter, 1865 (subgenus).
Octillænus Salter, 1866 (subgenus).
Thaleops Conrad, 1843.

—— **ambiguus** Foerste, 1885; Bull. Denison Univ., vol. 1, p. 106, pl. 14, figs. 9 a, b; fig. 10 a, b, c; fig. 11. Clinton.

—— **ambiguus** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 94.

—— **ambiguus** Foerste, 1886; 15th Ann. Rept. Geol. Nat. Hist. Survey Minnesota, p. 480, fig. 3.

—— **americanus** Billings, 1859; Canadian Naturalist, vol. 4, p. 371. Trenton.

—— **americanus** Billings, 1865; Pal. Foss., vol. 1, p. 329, fig. 316 a–d; fig. 318.

—— **angusticollis** Billings, 1859; Canadian Naturalist, vol. 4, p. 377, fig. 10 a–d. Trenton.

—— **arcturus** Hall, 1847; Pal. New York, vol. 1, p. 23, pl. 4 *bis*, fig. 12. Chazy and Trenton.

—— **arcturus** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 235, pl. 3, fig. 12.

—— **arcturus** (Hall) Billings, 1859; Canadian Naturalist, vol. 4, p. 379.

—— **arcturus** Billings, 1865; Pal. Foss., vol. 1, p. 279, fig. 265.

—— **armatus** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 330, pl. 22, figs. 1, 2. Niagara.

—— **armatus** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 418, pl. 22, figs. 1, 2; pl. 25, fig. 22.

—— **armatus**? Hall, 1875; 28th Rept. New York State Mus. Nat. Hist., pl. 32, figs. 19, 20.

—— **armatus**? Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 189, pl. 32, figs. 19, 20.

—— **armatus** Hall, 1883; 12th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, 1882, p. 335, pl. 34, figs. 19, 20; pl. 33, fig. 12.

—— **barriensis** (Murch.) Hall; Trans. Albany Inst., vol. 4, p. 227; abstract, p. 33, May, 1863.

—— **barriensis** (Murch.) Roemer, 1860; Die sil. Fauna W. Tennessee, p. 83, pl. 5, fig. 23. Niagara.

—— [*Bumastus*] **barriensis** (Murch.), 1839; Sil. Syst., p. 656, pl. 7 *bis*, figs. 3 a–d, pl. 14, fig. 7 (in part).

—— **barriensis** Salter, 1859; Murchison's Siluria (2d. ed.), pl. 17, figs. 9–11.

—— **bayfieldi** Billings, 1859; Canadian Naturalist, vol. 4, p. 369, figs. 4–6. Chazy.

—— **clavifrons** Billings, 1859; Canadian Naturalist, vol. 4, p. 379. Chazy and Trenton.

—— **conifrons** Billings, 1859; Canadian Naturalist, vol. 4, p. 378, figs. 7–9. Trenton.

—— *conradi* Billings, 1859; Canadian Naturalist, vol. 4, p. 372, figs. 7–9. (See **Panderia conradi**) Trenton.

—— **consimilis** Billings, 1865; Pal. Foss., vol. 1, p. 277, figs. 263 a–c; p. 331, fig. 317. Compare *Illænus esmarki* Schlotheim. Quebec.

—— **consobrinus** Billings, 1865; Pal. Foss., vol. 1, p. 280, fig. 268; p. 332, fig. 320. **Quebec.**

Illænus cornigerus Hall, 1872; 24th Rept. New York State Cab. Nat. Hist., p. 186, pl. 13, figs. 20, 21. Clinton.

—— [*Entomostracetes*] **crassicauda** Wahlenberg, 1821; Nova Acta Soc. Scient. Upsal., vol. 8, p. 27, pl. 2, figs. 5, 6 (not pl. 7, figs. 5, 6).

—— **crassicauda** Holm, 1882; Svenska Vet.-Akad. Handl., vol. 7, No. 3, pl. 2, figs. 21–27.

—— **crassicauda** ? Hall, 1847; Pal. New York, vol. 1, p. 24, pl. 4 *bis*, fig. 13; pl. 60, figs. 4 a–d.

—— **crassicauda** (Wahl.) Meek and Worthen, Geol. Survey Illinois, vol. 3, p. 322, pl. 3, figs. 1 a–1 b.

Compare *Illænus consimilis* and *I. esmarckii*.

—— **cuniculus** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 377, pl. 22, fig. 12. Niagara.

—— **cuniculus** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 421, pl. 22, fig. 12 (rev. ed.).

—— **daytonensis** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 119, pl. 5, figs. 14–16. Clinton.

—— **daytonensis** Foerste, 1885; Bull. Denison Univ., vol. 1, p. 104, pl. 14, figs. 4 a, b; figs. 6, 7, 7 a, b, c.

—— **daytonensis** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 93, pl. 8, figs. 1–7.

—— **fraternus** Billings, 1865; Pal. Foss., vol. 1, p. 276, figs. 262 a, b. Quebec.

—— **globosus** Billings, 1859; Canadian Naturalist, vol. 4, p. 367, figs. 1–3. Chazy.

—— [*Bumastus*] **graftonensis** Meek and Worthen, 1870; Proc. Acad. Nat. Sci. Phila., p. 54.

—— [*Bumastus*] **graftonensis** Meek and Worthen, 1875; Geol. Survey Illinois, vol. 6, p. 508, pl. 25, fig. 4.

—— **grandis** Billings, 1859; Canadian Naturalist, vol. 4, p. 380. Hudson River.

—— **herricki** Foerste, 1886; 15th Ann. Rept. Geol. Nat. Hist. Minnesota, p. 479, fig. 2. Trenton.

—— **imperator** Hall, 1861; Rept. Progress Geol. Survey Wisconsin, p. 49. Niagara.

—— **imperator** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 332, pl. 22, figs. 15–17; pl. 23, figs. 2, 3.

—— **imperator** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 420, pl. 22, figs. 15–17; pl. 23, figs. 2, 3.

—— **imperator** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 306, pl. 21, figs. 4, 5.

—— **incertus** Billings, 1865; Pal. Foss., vol. 1. p. 332, fig. 319. Quebec.

—— **indeterminatus** Walcott, 1877; Advanced sheets 31st Rept. New York State Mus. Nat. Hist., p. 19. Trenton.

—— **indeterminatus** Walcott, 1879; 31st Rept. New York State Mus. Nat. Hist., p. 70.

—— **insignis** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 331, figs. 5, 6, pl. 22, figs. 13, 14.

—— [*Bumastus*] **insignis** Salter, 1867; Mon. Brit. Tril., p. 207.

—— **insignis** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 331, figs. 5, 6; pl. 22, figs. 13, 14.

—— **insignis** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 419, figs. 10, 11; pl. 22, figs. 13, 14.

—— [*Bumastus*] **insignis** Meek, 1873; Pal. Ohio, vol. 1, p. 189, pl. 15, figs. 5 a–c.

—— **insignis** Holm, 1882; De Svenska Art. Tril. Illænus, p. 127.

—— **insignis** Whitfield, 1882; Geol. Wisconsis, vol. 4, p. 305, pl. 21, figs. 6–10.

—— **insignis** Foerste, 1886; 15th Ann. Rept. Geol. Nat. Hist. Survey Minnesota, p. 481.

—— **ioxus** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 378, pl. 22, figs. 4–10. Niagara.

—— [*Bumastus*] **ioxus** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 420, pl. 22, figs. 4–10.

Illænus [*Bumastus*] **ioxus** Hall, 1883; 12th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, 1882, p. 335, pl. 38, figs. 13, 14.

—— **ioxus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 304, pl. 21, figs. 11, 12.

—— [*Bumastus*] **ioxus** Hall, 1883; Trans. Albany Inst., vol. 10, p. 76.

—— **latidorsata** Hall, 1847; Pal. New York, vol. 1, p. 230, pl. 60, figs. 6 a, b. Trenton.

—— **madisonianus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 307, pl. 20, figs. 8, 9. Niagara.

—— **madisonianus** Foerste, 1885; Bull. Denison Univ., vol. 1, p. 106, pl. 14, figs. 1 a, b and 2 a, b.

—— **madisonianus** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 93, pl. 8, figs. 8–10. Clinton.

—— **milleri** Billings, 1859; Canadian Naturalist, vol. 4, p. 375, fig. 10. Trenton.

—— **milleri** Walcott, 1877; Advance sheets 31st Rept. N. Y. State Mus. Nat. Hist., p. 20.

—— **milleri** Walcott, 1879; 31st Rept. N. Y. State Mus. Nat. Hist., p. 71.

—— [*Nileus*] **minnesotensis** Foerste, 1886; 15th Ann. Rept. Geol. Minnesota, p. 478, fig. 1. Trenton.

—— *niagarensis* Whitfield, 1880; Ann. Rept. Geol. Wisconsin, 1879, p. 69. Niagara.

Name changed, by request of the Wisconsin Geological Survey, from *Illænus niagarensis* to **Illænus madisonianus**. Explanation omitted by accident in the Final Report Pal. Wisconsin, p. 307.

—— **orbicaudatus** Billings, 1859; Canadian Naturalist, vol. 4, p. 379. Hudson.

—— [*Thaleops*] **ovatus** Conrad, 1843; Proc. Acad. Nat. Sci. Phila., vol. 1, p. 332. Trenton.

—— [*Thaleops* (*Illænus*)] **ovatus** Hall, 1847; Pal. New York, vol. 1, p. 259, pl. 67, figs. 6 a–b.

—— **ovatus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 238, pl. 5, figs. 1, 2.

—— **pomatia** Salter, 1867; Mon. Brit. Tril., pl. 27, figs. 6, 7.

—— **pterocephalus** Whitfield, 1878; Ann. Rept. Geol. Wisconsin, 1877, p. 87. Niagara.

—— **pterocephalus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 309, pl. 20, figs. 10–12.

—— **simulator** Billings, 1865; Pal. Foss., vol. 1, p. 337, figs. 315 a, b. Quebec.

—— **taurus** Hall, 1861; Rept. Prog. Geol. Survey Wisconsin, p. 49. Niagara.

—— **taurus** Meek and Worthen, 1865; Geol. Survey Illinois, vol. 3, p. 320, pl. 3, fig. 2.

—— [*Bumastus*] **trentonensis** Emmons, 1842; Geol. New York, 3d Geol. Dist., p. 390 fig. 1. Trenton.

—— [*Bumastus*] **trentonensis**, 1854; 7th Rept. New York State Cab. Nat. Hist., p. 64, fig. 1.

—— [*Bumastus*] **trentonensis** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 215, pl. 15, fig. 13.

—— **trentonensis** Hall, 1847; Pal. New York, vol. 1, p. 230, pl. 60, fig. 5.

—— **tumidifrons** Billings, 1865; Pal. Foss., vol. 1, p. 278, fig. 264. Quebec.

—— **vindex** Billings, 1865; Pal. Foss., vol. 1, p. 179, fig. 160. Chazy.

—— [*Bumastus*] **worthenanus** Winchell and Marcy, 1866; Mem. Boston Soc. Nat. Hist., vol. 1, pt. 1, p. 105, pl. 3, fig. 13 (referred by Hall, 20th Rept. New York State Cab. Nat. Hist., to *Illænus armatus* Hall).

Isoletus De Kay, 1825; Annals Lyceum Nat. Hist. New York, vol. 1, p. 174.

—— *canalis*. (See **Asaphus canalis**.)

—— *cyclops*. (See **Asaphus platycephalus**.)

—— *gigas*. (See **Asaphus platycephalus**.)

—— *maximus*. (See **Asaphus maximus**.)

—— *megalops* Green, 1832; Mon. Tril. N. A., p. 70, cast 75.

—— *megistos*. (See **Asaphus maximus**.)

—— *platycephalus*. (See **Asaphus platycephalus**.)

—— *planus*. (See **Asaphus platycephalus**.)

Isoletus stegops. (See **Asaphus platycephalus.**)

—— *vigilans*. (See **Asaphus vigilans.**)

Lichas Dalman, 1826; Palæad., pp. 53, 71, pl. 6, fig. 1.

Type, *Lichas laciniatus* Wahlenberg.

Syn., *Platynotus* Conrad, 1838; Geol. Survey New York, Rept. Pal. Dept., p. 118.
Arges Goldfuss, 1839 (in part).
Metopias Eichwald, 1842; Die Urwelt Russ., p. 62, pl. 3, figs. 21–23.
Actinurus Castelnau, 1843; Syst. Sil. de l'Amér., p. 21.
Nuttainia Portlock and Emmrich.
Corydocephalus Corda, 1847; Prodr., p. 255.
Dicranopeltis Corda, 1847; Prodr., p. 257.
Acanthopyge Corda, 1847; Prodr., p. 260.
Dicranogmus Corda, 1847; Prodr., p. 261.

Subgenera, *Hoplolichas* Dames, 1877; Zeitschr. Deutsch. geol. Gesellsch., 1877, p. 794.
Type, *Hoplolichas tricuspidata* Beyrich.
Conolichas Dames, 1877; Zeitschr. Deutsch. geol. Gesellsch., 1877, p. 806.
Type, *Conolichas æquiloba* Steinhardt.

—— *armatus* Hall. (See **Acidaspis eriopis** Hall.)

—— **bigsbyi** Hall, 1859; Pal. New York, vol. 3, p. 364, pl. 77, figs. 1–8. Lower Helderberg.

—— [*Conolichas*] **bigsbyi**? Hall, 1888; Pal. New York, vol. 7, p. 80, pl. 19 a, fig. 1.

—— [*Paradoxides*] **boltoni** Bigsby, 1825; Jour. Acad. Nat. Sci. Phila., vol. 4, p. 365, plate. Niagara.

—— [*Paradoxides*] **boltoni** Green, 1832; Monthly Am. Jour. Geol., etc., vol. 1, p. 560, pl. 1, fig. 5.

—— [*Paradoxides*] **boltoni** Green, 1832; Mon. Tril. North America, p. 60, pl. 1, fig. 5.

—— [*Paradoxides*] **boltoni** Harlan, 1834; Trans. Geol. Soc. Penn., vol. 1, p. 103.

—— [*Paradoxides*] **boltoni** Harlan, 1835; Med. and Phys. Researches, p. 303.

—— [*Platynotus*] **boltoni** Conrad, 1838; Rept. Pal. Dept. Geol. Survey New York, p. 118.

—— [*Actinurus*] **boltoni** Castelnau, 1843; Syst. Sil. de l'Amér., p. 21, pl. 3, fig. 3.

—— **boltoni** Hall, 1852; Pal. New York, vol. 2, p. 311, pl. 69; pl. 70, figs. 1 a–i.

—— **boltoni** Meek and Worthen, 1875; Geol. Survey Illinois, vol. 6, p. 508, pl. 25, fig. 5.

—— **boltoni var. occidentalis** Hall, 1863; Trans. Albany Inst., vol. 4, p. 223; abstract, p. 29.

—— **boltoni var. occidentalis** Hall, 1875; 28th Rept. New York State Mus. Nat. Hist. Expl., p. 34, figs. 8–11.

—— **boltoni var. occidentalis** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 198, pl. 34, figs. 8–11.

—— **boltoni var. occidentalis** Hall, 1883; 12th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, 1882, p. 334, pl. 36, figs. 8, 11, 12 (?).

—— **breviceps** Hall, 1863; Trans. Albany Inst., vol. 4, p. 222; abstract, p. 28. Niagara.

—— **breviceps** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 156, pl. 6, fig. 17.

—— **breviceps** Hall, 1875; 28th Rept. New York State Mus. Nat. Hist. Expl., pl. 34, figs. 1–7.

—— **breviceps** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 197, pl. 34, figs. 1–7.

—— **breviceps** Hall, 1883; 12th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, 1882, p. 343, pl. 36, figs. 1–7.

—— **breviceps** Foerste, 1885; Bull. Denison Univ., vol. 1, p. 112, pl. 13, figs. 2, 6 a, b. Clinton.

Lichas breviceps Foerste, 1887; Bull. Denison Univ., vol. 2, p. 98, pl. 8, figs. 18, 19.

Not *Lichas breviceps* Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 377, pl. 21, figs. 12–14; also rev. ed., p. 424, pl. 21, figs. 12–14. (See **Lichas emarginatus.**)

—— **canadensis** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 65, fig. 22.

—— **champlainensis** Whitfield, 1886; Bull. Am. Mus. Nat. Hist. New York, vol. 1, No. 8, p. 342, pl. 23, figs. 6–8. Birdseye.

—— [*Arges*] **contusus** Hall, 1888; Pal. New York, vol. 7, p. 83, pl. 19 b, figs. 3–6. Upper Helderberg.

—— **cucullus** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., p. 266. Trenton.

—— **cucullus** Meek and Worthen, 1866; Geol. Survey Illinois, vol. 3, p. 299, pl. 1, figs. 6 a–c.

—— **decipiens** Winchell and Marcy, 1866; Mem. Boston Soc. Nat. Hist., vol. 1, pt. 1, p. 104, pl. 3, fig. 11. Niagara.

—— [*Ceratolichas*] **dracon** Hall, 1888; Pal. New York, vol. 7, p. 85, pl. 19, figs. 14–17. Hall, 1876; Illus. Devonian Foss. Crust., pl. 19, figs. 2, 3. Upper Helderberg.

—— **emarginatus** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 199. Niagara.

Syn., *Lichas breviceps* Hall; 20th Rept. New York State Cab. Nat. Hist., p. 377, pl. 21, figs. 12–14, rev. ed., p. 424, pl. 21, figs. 12–14.

—— **eriopis**, Hall. Upper Helderberg.

Syn., *Lichas armatus* Hall, 1861; Des. New Species Foss., p. 81.

Lichas armatus Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 109.

—— **eriops** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 226.

—— [*Acidaspis* (*Terataspis*)] **eriops** Hall, 1876; Illus. Devonian Foss. Crust., pl. 19, figs. 4–7, 10, 11.

—— [*Acidaspis* (*Terataspis?*)] sp.? Hall, 1876; Illus. Devonian Foss. Crust., pl. 19, fig. 12.

—— [*Conolichas*] **eriops** Hall, 1888; Pal. New York, vol. 7, p. 78, pl. 19 a, figs. 2–13, 15, 16.

—— **grandis** Hall, 1861; Des. New Species Foss., p. 82. Upper Helderberg.

—— **grandis** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 110.

—— **grandis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 223. (Subgenus *Terataspis.*)

Syn., ***superbus*** Billings, 1875; Canadian Naturalist, vol. 7, p. 239.

—— [*Acidaspis* (*Terataspis*)] **grandis** Hall, 1876; Illus. Devonian Foss. Crust., pls. 17, 18.

—— [*Terataspis*] **grandis** Hall, 1888; Pal. New York, vol. 7, p. 73, pl. 17, figs. 1–6; pl. 18, figs. 1, 2; pl. 19, figs. 1–7.

—— [*Ceratolichas*] **grandis** Hall, 1888; Pal. New York, vol. 7, p. 84, pl. 19 b, figs. 7–13.

—— [*Ceratolichas*] **gryps** Hall, 1888; Pal. New York, vol. 7, p. 84, pl. 19 b, figs. 7–13.

—— **harrisi** Miller, 1878; Jour. Cincinnati Soc. Nat. Hist., vol. 1, p. 106, pl. 3, fig. 9. Hudson.

—— [*Acidaspis* n. sp.?] Hall, 1876; Illus. Devonian Foss. Crust., pl. 19, fig. 1 (not figs. 2, 3). Upper Helderberg.

—— [*Conolichas*] **hispidus** Hall, 1888; Pal. New York, vol. 7, p. 77, pl. 19 a, figs. 14, 17, 18.

Syn., [*Acidaspis* (*Terataspis*)] *eriops* Hall, 1876; Illus. Dev. Foss., pl. 19, figs. 8, 9. Upper Helderb[illegible]

—— [*Hoplolichas*] **hylæus** Hall, 1888; Pal. New York, vol. 7, p. 81, pl. 19 b, figs[illegible] Upper Helder[illegible]

—— **jukesi** Billings, 1865; Pal. Foss., vol. 1, p. 282, fig. 260; also p. 335, fig. 3

Lichas minganensis Billings, 1865; Pal. Foss., vol. 1, p. 181, figs. 163 a, b. Chazy and Trenton.

—— **nereus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 226. Niagara.

—— **obvius** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 424, pl. 25, fig. 19. Niagara.

—— [*Calymene*] **phlyctanodes** Green, 1837; Am. Jour. Sci., 1st series, vol. 32, p. 167. Niagara.

—— [*Arges*] **phlyctanodes** Hall, 1852; Pal. New York, vol. 2, p. 314, pl. 70, figs. 2 a, c.

—— [*Dicranogmus*] **ptyonurus** Hall, 1888; Pal. New York, vol. 7, p. 86, pl. 19 b, figs. 19–21. Niagara.

—— **pugnax** Winchell and Marcy, 1866; Mem. Boston Soc. Nat. Hist., vol. 1, pt. 1, p. 103, pl. 3, fig. 10. Niagara.

—— **pugnax** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 393 (rev. ed., p. 424, pl. 25, fig. 20).

—— **pustulosus** Hall, 1859; Pal. New York, vol. 3, p. 366, pl. 77, figs. 9–12; pl. 78, figs. 1–6, fig. 7 (?). Lower Helderberg.

—— **pustulosus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 19, fig. 13.

—— [*Conolichas*] **pustulosus** Hall, 1888; Pal. New York, vol. 7, p. 80, pl. 19, figs. 8, 10, 11.

—— *superbus* Billings, 1875; Canadian Naturalist, n. s., vol. 7, p. 239. (See **Lichas grandis.**) Corniferous.

—— [*Asaphus?*] **trentonensis** Conrad, 1842; Jour. Acad. Nat. Sci. Phila., vol. 8, p. 277, pl. 16, fig. 16. Trenton.

—— [*Platynotus*] **trentonensis** Hall, 1847; Pal. New York, vol. 1, p. 235, pl. 64, figs. 1 a–e.

—— **trentonensis** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 127.

Lloydia Vogdes, 1889 (generic name for *Bathyurus bituberculatus* Billings for its type).

Loganellus Devine, 1863; Canadian Naturalist, vol. 8, p. 95. (See **Ptychoparia, Crepicephalus,** and **Olenus.**)

—— *logani* Devine, 1863; Canadian Naturalist, vol. 8, p. 95. (See **Ptychoparia logani.**)

—— [*Olenus?*] *logani* Billings, 1865; Pal. Foss., vol. 1, p. 201, figs. 185, 186.

—— *quebecensis* Billings, 1865; Pal. Foss., vol. 1, p. 203. (See **Ptychoparia logani.**)

Lonchocephalus Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 576. (See **Anomocare hamulus** (Owen) Dames.)

Megalaspis Angelin, 1852; Palæont. Scand., p. 15.

Type, *Megalaspis gigas* Ang., pl. 12, fig. 3.

—— **belemnurus** White, 1874; Rept. Invert. Foss., etc., p. 11. Quebec.

—— **belemnurus** White, 1877; Geog. Sur. W. 100th Meridian, Pal., vol. 4, p. 59, pl. 3, fig. 9.

—— [*Asaphus* (*meglaspis*)] **goniocerus** Meek, 1873; 6th Ann. Rept. Geol. Survey Territories, 1872, p. 480. Quebec.

Menocephalus Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 577.

Dr. D. D. Owen refers one species to this genus, *Menocephalus minnesotensis*, pl. 1, fig. 11, which has a highly arched and hemispherical glabella.

—— **globosus** Billings, 1860; Canadian Naturalist, vol. 5, p. 317, figs. 17–19. Quebec.

—— **globosus** Billings, 1865; Pal. Foss., vol. 1, p. 408, figs. 388 a–c.

—— **minnesotensis** Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 577, pl. 1, fig. 11. Cambrian.

—— **salteri** Billings, 1863; Canadian Naturalist, vol. 8, p. 210, figure. Cambrian.

—— **salteri** Billings, 1865; Pal. Foss., vol. 1, p. 203, fig. 187.

Menocephalus salteri? Rominger, 1888; Proc. Acad. Nat. Sci. Phila., pl. 16, pl. 1, fig. 6.

—— **sedgwicki** Billings, 1860; Canadian Naturalist, vol. 5, p. 316, fig. 16. Quebec.

—— **sedgwicki** Billings, 1865; Pal. Foss., vol. 1, p. 407, fig. 387.

Mesonacis Walcott, 1885; Am. Jour. Sci., 3d series, vol. 29, p. 329.

—— [*Olenus*] **vermontana** Hall, 1859; 12th Rept. New York State Cab. Nat. Hist., p. 60, figure. Cambrian.

—— [*Olenus*] **vermontana** Hall, 1859; Pal. New York, vol. 3, p. 527, figure.

—— [*Paradoxides*] **vermonti** Emmons, 1860; Manual Geology, p. 280 (note A).

—— [*Paradoxides*] **vermontana** Barrande, 1861; Bull. Soc. Géol. France, 2d series, vol. 18, p. 277, pl. 5, fig. 8.

—— [*Paradoxides*] **vermontana** Billings, 1861; Geology Vermont, vol. 2, p. 950.

—— [*Barrandia*] **vermontana** Hall, 1861; 13th Rept. New York State Cab. Nat. Hist., p. 117, figure.

—— [*Barrandia*] **vermontana** Hall, 1861; Geol. Vermont, vol. 1, p. 370, pl. 13, figs. 2, 4, and 5.

—— [*Paradoxides*] **vermontana** Billings, 1863; Geol. Canada, p. 953.

—— [*Olenellus*] **vermontana** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 114.

—— [*Olenellus*] **vermontana** Billings, 1865; Pal. Foss., vol. 1, p. 10.

—— [*Olenellus*] **vermontana** Whitfield, 1884; Bull. Am. Mus. Nat. Hist. New York, vol. 1, p. 152, pl. 15, figs. 2–4.

—— **vermontana** Walcott, 1885; Am. Jour. Sci., 3d series. vol. 29, p. 329, figs. 1, 2.

—— **vermontana** Walcott, 1885; Nature, vol. 32, p. 68.

—— **vermontana** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 158, pl. 24, figs. 1 a, b.

Microdiscus Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 116.

Type, ***Microdiscus speciosus*** Ford.

—— **belli-marginatus** Shaler and Foerste, 1888; Bull. Mus. Comp. Zool. Harvard Coll., vol. 16, p. 35, pl. 2, fig. 19. Cambrian.

—— **connexus** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 194, pl. 1, figs. 4–4 b. Cambrian.

—— **dawsoni** Hartt, 1868; Acadian Geology, p. 654, fig. 228. St. John.

Mr. Hartt originally described this species under the new generic name of *Dawsonia*, but on Mr. E. Billings's authority the species was referred to *Microdiscus* in the Acadian Geology.

—— **dawsoni** Whiteaves, 1878; Am. Jour. Sci., 3d series, vol. 16, p. 225.

—— **dawsoni** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 23, pl. 2, figs. 3, 3 a.

—— [*Agnostus*] **lobatus** Hall, 1847; Pal. New York, vol. 1, p. 258, pl. 67, figs. 5 a–f. Potsdam.

—— [*Agnostus*] **lobatus** Rogers, 1858; Geol. Survey Pennsylvania, vol. 2, p. 820, fig. 614 (1–4).

—— **lobatus** Ford, 1873; Am. Jour. Sci., 3d series, vol. 6, p. 135 (foot-note).

—— **lobatus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 156, pl. 16, figs. 1, 1 a, b.

—— **lobatus** Shaler and Foerste, 1888; Bull. Mus. Comp. Zool. Harvard Coll., vol. 16, p. 36, pl. 2, fig. 13.

—— **meeki** Ford, 1876; Am. Jour. Sci., 3d series, vol. 11, p. 371. Lower Potsdam.

—— **meeki** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 155, pl. 16, fig. 4.

—— **parkeri** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 157, pl. 16, figs. 2, 2 a. Middle Cambrian.

—— **pulchellus** (Hartt MS.) Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 24. St. John.

—— **punctatus** Salter, 1864; Quart. Jour. Geol. Soc. London, vol. 20, p. 237, pl. 13, fig. 11. St. John.

—— **punctatus** Whiteaves, 1878; Am. Jour. Sci., 3d series, vol. 16, p. 225.

Microdiscus punctatus Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 24, pl. 2, figs. 1, 1 a–c.

—— **quadricostatus** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 116, pl. 1, fig. 8. Taconic.

—— **quadricostatus** Emmons, 1860; Manual Geology, p. 88, fig. 73.

—— **quadricostatus** Barrande, 1861; Bull. Soc. Géol. France, 2d series, vol. 18, p. 280, pl. 5, figs. 13 a, b.

—— **speciosus** Ford, 1873; Am. Jour. Sci., 3d series, vol. 6, p. 137, figs. 2 a, b. Potsdam.

—— **speciosus** Ford, 1877; Am. Jour. Sci., 3d series, vol. 13, p. 147.

—— **speciosus** Ford, 1879; New York Tribune Extra, Sept. 2, 1879, fig. 2.

—— **speciosus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 154, pl. 16, figs. 3, 3 a–c.

Nileus Dalman, 1826; Palæad., p. 246 (German trans., p. 49).

Type, *Nileus armadillo* Dalman.

—— **affinis** Billings, 1865; Pal. Foss., vol. 1, p. 275, figs. 261 a, b. Quebec.

—— **macrops** Billings, 1865; Pal. Foss., vol. 1, p. 273, fig. 259. Quebec.

—— **scrutator** Billings, 1865; Pal. Foss., vol. 1, p. 274, fig. 260. Quebec.

Nuttania Eaton, 1832 (in part); Geological Text Book, p. 33. (See **Trinucleus** and **Homalonotus**.)

—— *concentrica* Eaton, 1832; Geological Text Book, p. 34, pl. 1, fig. 2.

—— *sparsa* Eaton, 1832; Geological Text Book, p. 34.

Odontocephalus Conrad, 1840; 3d Ann. Rept. Pal. Dept. New York Geol. Survey, p. 204.

—— [*Dalmanites* (*Odontocephalus*)] Hall and Clarke, 1888; Pal. New York, vol. 7, p. xxxiii.

I can not do justice to this genus without giving a brief historical sketch, which dates back to 1781. During this year M. T. Brünnich (Beskrivelse over Trilobiten, Nye Samling af det Kong. Danske Vidensk. Skrifter, vol. 1, p. 392, pl. 0, figs. 1, 2) published a description of a fossil Trilobite from Coalbrook Dale under the name of *Trilobus caudatus*. As this Trilobite in after years had many generic names, I give a translation of the original description for the use of students. The author figures the head and pygidium of *Trilobus caudatus* and remarks: "As I was not fortunate enough to obtain a complete specimen of the entirely unknown fossil, but only broken parts, I can not distinctly describe its size or number of rings; however, the annexed figures show the distinct features of this species and their peculiar morphology. The size of the fossil at its anterior bend is 1¾ inches, the front piece outside of the crust is ⅛ inch, its total length 34 inches; the broken back part, consisting of about sixteen rings, is 1 inch in length to the tail, the latter being 1 inch long. The head shield is surrounded by a flat-shaped edge, which terminates in an upright protuberance with a tongue rounded anteriorly. The shell shows various elevations separated by transverse furrows. The eyes on the side of the shell are very protruding, semilunar in form, and faceted after the eyes of insects. On the head-shield may be seen some small nodes, which are also visible on the first ring and on some of the others. The tail diminishes in breadth and terminates in a narrow, long, and pointed projection."

The first systematic writer (Brongniart, Crust. Foss., p. 22) included this species under his genus *Asaphus*, and it was so classified until 1844, when Dr. H. F. Emmrich (Zur Morphologie der Trilobiten, p. 15, pl. 1, fig. 1) proposed the new generic term of *Dalmania* for it. Unfortunately this term was then preoccupied for a genus of the Diptera. Dr. H. F. Emmrich's work was well known in Europe, having appeared in two separate German editions, and also in English (Scient. Mem., vol. 4, pt. 14, 1847).

In the year 1847 A. J. C. Corda (Prodr., p. 208, pl. 5, fig. 56) changed Emmrich's [illegible]neric name to *Odontochile*, a preoccupied term in natural history. This name was only used by one other author (McCoy, Annals Nat. Hist., London, vol. 4, 1849), all others using *Dalmania* or its modified form, *Dalmanites* (Barrande).

In 1840 Milne-Edwards (Crust., pp. 306, 339) proposed the name of *Pleuracanthus* for *Calymene arachnoides* Goldfuss, and Dr. Goldfuss that of *Acaste* (Neues Jahrbuch für Mineral., 1843, p. 511) for such forms as *Calymene downingia* Murch.

In America a typical species (*Dalmanites limulurus*) has been classed by all American writers either under *Dalmania* or its modified form, but other species properly of this genus—that is, if we do not desire to overburden generic classification—have been given new generic names. The first was an obscure fossil described by Dr. Jacob Green (Am. Jour. Sci., 1st series, vol. 32, p. 343) as *Cryphœus boothi*, a generic term preoccupied for a genus of the Coleoptera at the time it was used by Dr. Green. The second species consists of a poorly figured tail, described and figured by Prof. Amos Eaton (Geological Text Book, p. 31, pl. 1, fig. 1) as *Asaphus selenurus*, and by Dr. Jacob Green under the name of *Calymene odontocephala* (Am. Jour. Sci., 1st series, vol. 25, p. 334). Prof. Amos Eaton's description was drawn from the tail of the fossil and Dr. Jacob Green's from the head.

Mr. T. A. Conrad in 1840 (3d Ann. Rept. Pal. Dept. New York Geol. Survey, p. 204) procured a perfect specimen of this Trilobite and united the two species under a new generic name, *Odontocephalus selenurus*, taking Dr. Jacob Green's specific name for the genus, and that of Prof. Amos Eaton for the species.

The generic characteristics consist of a series of incisor-like denticulations bordering the frontal margin of the head, and a pygidium with two terminal spines.

Hall and Clarke (1888, Pal. New York, vol. 7, p. xxxiii) use the term as a subgenus to *Dalmanites*.

If we follow the strict rule of priority and set aside the preoccupied name *Dalmania* or *Dalmanites* for that of *Odontocephalus* Conrad, we take for a generic name a term indicating a denticulated cephalic shield, which is confined to a special group and miscall such species as the well known type *Dalmanites caudatus*.

We would therefore suggest, not only in honor of the learned Swedish author on Trilobites, but also through courtesy, that the generic name of *Dalmanites* be retained.

Odontocephalus. (See **Dalmanites** [*Odontocepnalus*] **selenurus**, **D.** [*Odontocephalus*] **bifidens**, **D.** [*Odontocephalus*] **aegeria**, and **D.** [*Odontocephalus*] **coronatus**.

Ogygia Brongniart, 1822; Crust. Foss., p. 26.

Type, ***Asaphus buchii*** Brongniart, pl. 2, figs. 3 a–c.

—— [***Asaphus***] **barrandi** Hall, 1851; Rept. Geol. Lake Superior Land Dist. (Foster and Whitney), pt. 2, p. 210, pl. 27, figs. 1 a–d; pl. 28. Birdseye.

—— [***Asaphus***] **barrandi** Hall, 1862; Geol. Wisconsin, vol. 1, p. 41, fig. 4.

—— **klotzi** Rominger, 1887; Proc. Acad. Nat. Sci. Phila., p. 12, pl. 1, fig. 1. Cambrian.

—— **klotzi** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 166.

—— [***Ogygies***] ***latissimus*** Eaton, 1832; Am. Jour. Sci., vol. 21, p. 136, foot-note.

—— [***Ogyges***] ***latissimus*** Eaton, 1832; Geol. Text Book, p. 33 (**Homalonotus delphinocephus**).

—— **parabola** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 245, pl. 2, fig. 35. Cambrian.

—— **? problematica** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 63, pl. 10, figs. 2 a, b and 4. Cambrian.

—— **producta** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 234, pl. 2, figs. 31–34; also p. 245, pl. 2, fig. 35. Cambrian.

—— [***Niobe***] **producta** Brögger, 1886; Om alderen af Olenellus zonæ i Nordamerika, p. 211.

Ogygia [*Bathyuriscus*] **productus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 217, pl. 30, figs. 1, 1 a–i.

Syn., *Ogygia parabola* (H. & W.) Walcott, 1886; *idem.*, p. 217.

—— **serrata** Rominger, 1887; Proc. Acad. Nat. Sci. Phila., p. 13, pl. 1, figs. 2, 2 a. Cambrian.

—— ? *spinosa* Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 63, pl. 9, fig. 22. (See **Olenoides spinosa** Walcott.)

—— **vetustus** Hall, 1847; Pal. New York, vol. 1, p. 227, pl. 60, fig. 1. Trenton.

—— **vetustus** Emmons, 1855; American Geology, vol. 1, pt. 2, p. 216, fig. 72.

Olenellus Hall, 1861; Des. N. Species of Foss., published in advance, 15th Rept. State Cab., p. 86. Hall, 1862; 15th Rept. State Cab. Nat. Hist. Albany, p. 114.

Type, *Olenellus thompsoni* Hall.

—— [*Elliptocephala*] **asaphoides** Emmons, 1844; Taconic System, p. 21, figs. 1–3. Cambrian.

—— [*Elliptocephala*] **asaphoides** Emmons, 1846; Agric. New York, vol. 1, p. 65, figs. 1–3.

—— [*Olenus*] **asaphoides** Hall, 1847; Pal. New York, vol. 1, p. 256, pl. 67, figs. 2 a, c.

—— [*Olenus*] **asaphoides** Fitch, 1849; Trans. N. Y. State Agric. Soc., vol. 9, p. 865.

—— [*Elliptocephalus*] **asaphoides** Emmons, 1849; Proc. Am. Assoc. Adv. Sci., 1st meeting, p. 18.

—— [*Eliptocephalus*] **asaphoides** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 114, figs. 1–3, pl. 1, fig. 18.

—— [*Paradoxides*] **asaphoides** Emmons, 1860; Manual Geology, pp. 87, 280.

—— [*Paradoxides*] **asaphoides** Barrande, 1861; Bull. Soc. Géol. France, 2d series, vol. 18, p. 273, pl. 5, figs. 4, 5.

—— [*Olenus*] **asaphoides** Ford, 1871; Am. Jour. Sci., 3d series, vol. 2, p. 33.

—— [*Elliptocephalus*] **asaphoides** Ford, 1877; Am. Jour. Sci., 3d series, vol. 13, p. 266, plate, figs. 1–10.

—— [*Elliptocephalus*] **asaphoides** Ford; Am. Jour. Sci., 3d series, vol. 15, p. 129.

—— **asaphoides** Ford, 1881; Am. Jour. Sci., 3d series, vol. 22, p. 250.

—— **asaphoides** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 168, pl. 17, figs. 4, 8, 10; pl. 20, figs. 3, 3 a, b; pl. 25, fig. 8.

—— **gilberti** (Meek MS.) White, 1874; Prelim. Rept. Invt. Foss. U. S. Geog. and Geol. Survey West 100th Mer., p. 7. Potsdam.

—— [*Olenus*] **gilberti** Gilbert, 1875; U. S. Geog. Survey West 100th Mer., vol. 3, p. 182.

—— **gilberti** White, 1877; U. S. Geog. Survey West 100th Mer., vol. 4, p. 44, pl. 2, figs. 1, 3 a–e.

—— **gilberti** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 29, pl 9, figs. 16, 16 a; pl. 21, fig. 13.

—— **gilberti** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 170, pl. 18, figs. 1, 1 a–c; pl. 19, fig. 2, 2 a–k; pl. 20, figs. 1, 1 a, 1 b, 4.

—— **howelli** (Meek MS.) White, 1874; Prelim. Rept. Invt. Foss. U. S. Geog. and Geol. Survey West 100th Mer., p. 8. Potsdam.

—— [*Olenus*] **howelli** Gilbert, 1875; U. S. Geog. Survey West 100th Mer., vol. 3, p. 183.

—— **howelli** White, 1877; U. S. Geog. Survey West 100th Mer., vol. 4, p. 47, pl. 2, figs. 4 a, b.

—— **howelli** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, pp. 29, 30, pl. 9, figs. 15 a–b, 16–16 a; pl. 21, figs. 1–9.

—— **iddingsi** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 28, pl. 9, fig. 12. Cambrian.

—— **iddingsi** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 170, pl. 19, fig. 1.

—— [*Paradoxides*] **macrocephalus** Emmons, 1860; Manual Geology, p. 88, fig. 70.

—— [*Olenus*] **thompsoni** Hall, 1859; 12th Rept. New York State Cab. Nat. Hist., p. 57, figure. Cambrian.

Olenellus [*Olenus*] **thompsoni** Hall, 1859; Pal. New York, vol. 3, p. 525, figure.

—— [*Barrandia*] **thompsoni** Hall, 1860; 13th Rept. New York State Cab. Nat. Hist., p. 116, figure.

—— [*Paradoxides*] **thompsoni** Emmons, 1860; Manual Geology, p. 280, note A.

—— [*Paradoxides*] **thompsoni** Barrande, 1861; Bull. Soc. Géol. France, 2d series, vol. 18, p. 276, pl. 5, fig. 6.

—— [*Paradoxides*] **thompsoni** Billings, 1861; Geol. Vermont, vol. 2, p. 950.

—— [*Barrandia*] **thompsoni** Hall, 1861; Geol. Vermont, vol. 2, p. 369, pl. 13, fig. 1.

—— [*Paradoxides*] **thompsoni** Billings, 1861; Pal. Foss., vol. 1, p. 11 (pamphlet published in advance).

—— **thompsoni** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist, p. 114.

—— **thompsoni** Billings, 1863; Geol. Canada, p. 953.

—— [*Olenellus*] **thompsoni** Billings, 1865; Pal. Foss., vol. 1, p. 11.

—— **thompsoni** Whitfield, 1884; Bull. Am. Mus. Nat. Hist., New York, vol. 1, p. 151 pl. 15, figs. 1-4.

—— **thompsoni** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 167, pl. 17, figs. 1, 2, 4, 9; pls. 22, 23, figure.

—— *vermontana*. (See **Mesonacis vermontána** (Hall) Walcott.)

Olenoides Meek, 1877; U. S. Geol. Expl. 40th Par., Pal., vol. 4, p. 25.

Type, *Olenoides nevadensis* Meek.

—— **fordi** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 195, pl. 1, figs. 5, 5 b. Cambrian.

—— *flagricaudus*. (See **Zacanthoides flagricaudus**.)

—— *levis* Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 187, pl. 25, figs. 3-3 a. (See **Zacanthoides levis**.) Cambrian.

—— *gothicus* (Hall and Whitfield) Walcott. (See **Dorypyge gothicus**.)

—— ? **marcoui** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 186, pl. 26, fig. 5-5 a, b.

—— [*Dikellocephalus ?*] **marcoui** Whitfield, 1884; Bull. Am. Mus. Nat. Hist. New York, vol. 1, p. 150, pl. 14, fig. 7. Cambrian.

—— [*Paradoxides ?*] **nevadensis** Meek, 1870; Proc. Acad. Nat. Sci. Phila., vol. 22, p. 62. Middle Cambrian.

—— [*Paradoxides ?*] **nevadensis** Meek, 1877; U. S. Geol. Expl. 40th Par., Pal., vol. 4, p. 23, pl. 1, fig. 5.

—— **nevadensis** Meek, 1877; U. S. Geol. Expl. 40th Par., Pal., vol. 4, p. 25.

—— **nevadensis** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 181, pl. 25, fig. 7.

—— **nevadensis** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165.

Syn., *Ogygia serrata* (Rominger) Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165.

—— [*Olenoides*] *quadriceps* (Hall and Whitfield) Walcott. (See **Dorypyge quadriceps**.)

—— *spinosus*. (See **Zacanthoides spinosus**.)

—— *typicalis*. (See **Zacanthoides typicalis**.)

—— [*Dikellocephalus*] **wahsatchensis** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Pal., vol. 4, p. 241, pl. 1, fig. 35.

—— **wahsatchensis** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 189, pl. 29, figs. 2, 2 a. Middle Cambrian.

Syn., [*Dikellocephalus ?*] *gothicus* (Hall and Whitfield) Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 189.

—— **wahsatchensis** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165.

Olenus Dalman, 1826; Palæad, p. 226.

Type, *Olenus gibbosus* Wahlenberg.

—— *asaphoides*. (See **Olenellus asaphoides**.)

—— *holopyga*. (See **Bathynotus holopyga**.)

—— *logani*. (See **Ptychoparia logani**.)

Olenus *thompsoni*. (See **Olenellus thompsoni.**)

—— **undulostriatus** Hall, 1847; Pal. New York, vol. 1, p. 258, pl. 67, figs. 3 a, b. **Hudson.**

—— **utahensis** Woodward, 1873; Rept. 43d Meeting Brit. Assoc. Adv. Sci.

—— **utahensis** Woodward, 1873; Geol. Mag., vol. 10, p. 523. **Cambrian.**

—— *vermontana*. (See **Mesonacis vermontana Hall.**)

Oryctocephalus Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 210.

—— **primus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 210, pl. 29, figs. 3, 3 a. **Middle Cambrian.**

Pagura Emmons, 1860; Manual Geology, p. 280.

Dr. E. Emmons uses this term in a subgeneric sense for *Paradoxides* [*Pagura*] *quadrispinosus*. The note accompanying the Manual of Geology does not indicate the author's intentions with regard to the genus and new species. It was probably intended for *Paradoxides* [*Peltura*] *quadrispinosus*, a synonym of intended *Peltura* [*Olenus*] *holopyga* Hall, 12th Rept. New York State Cab. Nat. Hist., p. 61. Emmons figures this species on p. 80, fig. 57.

Panderia Volborth; Mém. Acad. Sci. St.-Pétersbourg, vol. 6, p. 31.

Type, *Panderia triquetra* Volb., pl. 3, fig. 13 *bis*, 17.

—— [*Illænus*] **conradi** Billings, 1859; Canadian Naturalist, vol. 4, p. 372, figs. 7–9. **Trenton.**

For other references, see *Illænus conradi* Billings.

Paradoxides Brongniart, 1822; Crust. Foss., p. 30, pl. 4, fig. 1.

Type, *Paradoxides tessini* Brongniart.

Syn., *Plutonia* Salter, 1869; Quart. Jour. Geol. Soc. London, vol. 25, p. 52.

Plutonia sedgwicki, Quart. Jour. Geol. Soc. London, vol. 27, p. 399, pl. 15, figs. 1–8.

—— **acadicus** Matthew, 1882; Trans. Roy. Soc. Canada, vol. 1, p. 103, pl. 9, figs. 16–18. **St. John.**

—— **acadicus** Matthew, 1884; Trans. Roy. Soc. Canada, vol. 2, p. 99, pl. 1, fig. 1.

—— **acadicus** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 25, pl. 6, figs. 3–3 a.

—— *arcuatus* Harlan. (See **Triarthrus beckii.**)

—— **barberi** Winchell, 1884; 13th Rept. Geol. Nat. Hist. Survey Minn., p. 65, pl. 1, fig. 7. **Cambrian.**

—— *beckii*. (See **Triarthrus beckii.**)

—— **bennetii** Salter, 1859; Quart. Jour. Geol. Soc. London, vol. 15, p. 553, figure. **Cambrian.**

—— **bennetii** Salter and Woodward, 1865; Chart of Foss. Crust., fig. 25.

—— *boltoni*. (See **Lichas boltoni.**)

—— **decorus** Billings, 1865; Pal. Foss., vol. 2, p. 75. **Potsdam.**

—— *eatoni*. (See **Triarthrus beckii.**)

—— **eteminicus** Matthew, 1882; Trans. Roy. Soc. Canada, vol. 1, p. 92, pl. 9, figs. 7–12. **St. John.**

Var. *suricoides* (figs. 4–6), var. *breviatus*, var. *malicitus* (fig. 13), var. *pontificalis* (figs. 15, 15 a), var. *quacoensis* (figs. 14, 14 a).

—— **eteminicus** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 27, pl. 3, figs. 1–1 a–g.

—— **harlani** Green, 1834; Am. Jour. Sci., 1st series, vol. 35, p. 336. **Cambrian.**

—— **harlani** Green, 1835; Suppl. Mon. Tril. N. A., p. 14, cast 39.

—— **harlani** Rogers, 1856; Proc. Boston Soc. Nat. Hist., vol. 6, pp. 27, 40.

—— **harlani** Stodder, 1856; Proc. Boston Soc. Nat. Hist., vol. 6, p. 369.

—— **harlani** Rogers, 1856; Am. Jour. Sci., 2d series, vol. 22, p. 297.

Syn., *spinosus* Rogers, 1858; Geol. Pennsylvania, vol. 2, p. 816, fig. 590.

—— **harlani** Ordway, 1861; Proc. Boston Soc. Nat. Hist., vol. 8, p. 1, figure.

—— **harlani** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 45, pl. 7, fig. 3; pl. 8, figs. 1, 1 a–c; pl. 9, fig. 1.

Paradoxides kjerulfi (Linrs.) Matthew, 1886; Am. Jour. Sci., 3d series, vol. 31, p. 471. Cambrian.

Referred by Holm (Geol. Fören. Stockholm Förhandl., vol. 9, 1887, häfte. 7, p. 1) to *Olenellus kjerulfi* Linnarsson, pls. 14 and 15.

—— **lamellatus** Hartt, 1868; Acadian Geology, p. 656, fig. 230. St. John.

—— **lamellatus** Matthew, 1882; Trans. Royal Soc. Canada, vol. 1, p. 100, pl. 1, figs. 3, 4.

—— **lamellatus var. loricatus** Matthew, 1882; Trans. Royal Soc. Canada, vol. 1, p. 105, pl. 9, fig. 19.

—— **lamellatus** Walcott, 1884; Bull. U. S. Geol. Survey, No. 30, p. 25, pl. 3, figs. 2, 2 a.

—— *macrocephalus*. (See **Olenellus thompsoni** Hall.)

—— **micmac** Hartt, 1868; Acadian Geology, p. 657. St. John.

—— **micmac** Matthew, 1884; Trans. Royal Soc. Canada, vol. 2, p. 101, pl. 10, fig. 8.

—— ? *nevadensis*. (See **Olenoides nevadensis**.)

—— *quadrispinosus*. (See **Bathynotus quadrispinosus**.)

—— **tenellus** Billings, 1874; Pal. Foss., vol. 2, p. 74, fig. 43. Potsdam.

—— *thompsoni*. (See **Olenellus thompsoni** Hall.)

—— *triarthrus* Harlan; Trans. Geol. Soc. Pennsylvania, vol. 1, p. 264, pl. 15, fig. 5. (See **Triarthrus becki** Green.)

—— *vermontana*. (See **Olenellus** and **Mesonacis**.)

—— **walcotti** Shaler and Foerste, 1888; Bull. Mus. Comp. Zool. Harvard Coll., vol. 16, p. 36, pl. 2, fig. 12. Cambrian.

Peltura Milne-Edwards, 1840; Crust., vol. 3, p. 344.

—— (See **Pagura**.)

—— *holopyge*. (See **Bathynotus holopyge**.)

Pemphigaspis Hall, 1863; 16th Rept. New York State Mus. Nat. Hist., p. 221.

—— **bullata** Hall, 1863; 16th Rept. New York State Mus. Nat. Hist., p. 221, pl. 5 a, figs. 3-5. Potsdam.

A species probably of the genus *Microdiscus*.

Phacops Emmrich, 1839; De Trilobites, etc., p. 18.

Type, *Calymene latifrons* Bronn.

The generic term *Trimerocephalus* McCoy has been used by authors for species like *Phacops volborthi*, compact in form; glabella inflated and expanded in front; lobes, except the basal ones, obscure; eyes small and occupying the front portions of the head; genal angles rounded; pleura rounded; pygidium small, with few segments, and even border.

Acaste Goldfuss for such species as *Phacops downingiæ* Murch. Diagnosis: Glabella not inflated nor greatly expanded in front; furrows distinct; eyes well developed, with numerous lenses; genal angles produced into spines; pleuræ rounded or truncate; pygidium small generally, with less than eleven segments; border even, but sometimes mucronate.

—— [*Calymene*] **bufo** Green, 1832; Monthly Am. Jour. Geol., p. 559.

—— [*Calymene*] **bufo** Green, 1832; Mon. Tril. N. A., p. 41, cast 10.

—— **bufo** Hall, 1861; Des. New Species Foss., p. 65.

—— **bufo** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 93.

—— **bufo** Hall, 1876; Illus. Devonian Foss. Crust., pl. 8, figs. 24, 25.

—— **bufo** Hall, 1888; Pal. New York, vol. 7, p. 26, pl. 8, figs. 25, 26.

The fossil is said to have been found in a dark grayish limestone in the State of New Jersey. The cast approaches so near *Phacops latifrons* Bronn that it may be the same species.

—— *bombifrons*. (See **Phacops cristata**.)

—— **cacapona** Hall, 1861; Des. New Species Foss., p. 68. Hamilton.

Syn., *Calymene bufo* Castelnau, 1843; Syst. Sil. de l'Amér., p. 21, pl. 2, figs. 1-4.

—— **cacapona** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 96.

Phacops cacapona Hall, 1876; Illus. Devonian Foss. Crust., pl. 8, figs. 18–23.

—— **cacapona** Hall, 1888; Pal. New York, vol. 7, p. 27, pl. 8, figs. 19–24.

—— *callicephala*. (See **Dalmanites callicephala.**)

—— **cristata** Hall, 1861; Des. New Species Foss., p. 67. Upper Helderberg.

Syn., *Phacops bombifrons* Hall, 1861; Des. New Species Foss., p. 67.
Phacops cristata Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 95.
Phacops cristata Hall, 1876; Illus. Devonian Foss. Crust., pl. 6, figs. 1–17.
Phacops bombifrons Hall, 1876; Illus. Devonian Foss. Crust., pl. 6, figs. 18–29.

—— **cristata** Hall, 1888; Pal. New York, vol. 7, p. 14, pl. 6, figs., 1–31, 16–29; pl. 8 a, figs. 1–4.

—— **cristata** var. **pipa** Hall, 1888; Pal. New York, vol. 7, p. 18, pl. 8 a, figs. 5–18. Upper Helderberg.

—— *downingæ* Murch. (See **Phacops trisulcatus** Hall.)

—— **hudsonica** Hall, 1859; Pal. New York, vol. 3, p. 355, pl. 73, figs. 26–28. Lower Helderberg.

—— ? *laticauda* Hall, 1847; Pal. New York, vol. 1, p 248, pl. 64, fig. 6. (See **Dalmanites micrurus** Green.)

—— **logani** Hall, 1859; Pal. New York, vol. 3, p. 353, pl. 73, figs. 15–25. Lower Helderberg.

—— [*Calymene*] **macrophthalma** Green, 1832; Mon. Tril. N. A., p. 39, cast 9.

—— [*Calymene*] **nupera** Hall, 1843; Geol. New York, 4th Geol. Dist., p. 262, fig. 116. Chemung.

—— **nupera** Emmons, 1860; Manual Geology, p. 149, fig. 138 (2).

—— **nupera** Hall, 1876; Illus. Devonian Foss. Crust., pl. 8, fig. 26.

—— **nupera** Hall, 1888; Pal. New York, vol. 7, p. 27, pl. 8, fig. 27.

—— **orestes** Billings, 1860; Canadian Naturalist, vol. 5, p. 65, fig. 10. Middle Silurian.

—— **pulchellus** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 99, pl. 8, figs. 4, 20, 21. Clinton.

—— [*Calymene bufo*] var. **rana** Green, 1832; Monthly Am. Jour. Geol., p. 559. Hamilton.

—— [*Calymene bufo*] var. **rana** Green, 1832; Mon. Tril. N. A., p. 42, casts 11, 12.

—— [*Calymene bufo*] var. **rana** Hall, 1843; Geol. New York, 4th Geol. Dist., p. 201, pl. 14.

Syn., [*Calymene*] *bufo* Owens, 1844; Geol. Expl. Iowa, Wisconsin, and Illinois, p. 74, pl. 12, fig. 1.
[*Calymene*] *bufo* Emmons, 1860; Manual Geology, p. 138, wood-cut 124, fig. 6.

—— **rana** Hall, 1861; Description New Species Fossils, p. 65.

—— **rana** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 93, pl. 10, fig. 12.

—— **rana** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 447, pl. 11, figs. 1 a–e.

—— **rana** Nicholson, 1873; Pal. Province Ontario, p. 123, figs. 5, 6 a.

—— **rana** Hall, 1876; Illus. Devonian Foss. Crust., pl. 6, figs. 14, 15; pl. 7, figs. 1–11; pl. 8, figs. 11–17.

—— **rana** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 339, pl. 26, figs. 17–19.

—— **rana** Walcott, 1884; Pal. Eureka Dist. Mon. U. S. Geol. Survey, vol. 8, p. 207.

—— **rana** Hall, 1888; Pal. New York, vol. 7, p. 19, pl. 7, figs. 1–11; pl. 8, figs. 1–18; pl. 7 a, figs. 21–33.

—— **rana** Clarke, 1888; Jour. Morphology, vol. 2, p. 253, pl. 21.

—— **traganus** Billings, 1863; Proc. Portland Soc. Nat. Hist., vol. 1, p. 124, pl. 1, figs. 26, 27. Upper Silurian.

—— ? **trisulcatus** Hall, 1843; Geol. New York, 4th Geol. Dist., p. 72, fig. 9. Clinton.

—— **trisulcatus** Hall, 1852; Pal. New York, vol. 2, p. 300, pl. 66 a, figs. 3 a, b.

Phæthonides Angelin, 1852; Pal. Scand., p. 21.

—— **arenicolus** Hall, 1888; Pal. New York, vol. 7, p. 134, pl. 25, figs. 12, 13. Upper Helderberg.

—— **denticulatus** (Meek) Hall, 1888; Pal. New York, vol. 7, p. 139, pl. 25, figs. 14, 15.
For other references, see **Proetus** [*Phaeton*] **denticulatus** Meek.
Steptoe Valley, Nevada, Devonian (?).

—— **gemmaeus** Hall, 1888; Pal. New York, vol. 7, p. 136, pl. 24, figs. 32–36. Upper Helderberg.

—— **immaturus** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 59, pl. 1, figs. 9-15. Kinderhook.

—— (?) **lodiensis** (Meek) Herrick, 1889; Bull. Denison Univ., vol. 4, p. 59.
For other references, see **Brachymetopus lodiensis** Meek.

—— **occidentalis** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 57, pl. 1, figs. 10 a, b. Kinderhook.

—— **sedaliensis** (Vogdes) Herrick, 1889; Bull. Denison Univ., vol. 4, p. 57. Waverly.
For other references, see **Griffithides ? sedaliensis** Vogdes.

—— **spinosus** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 58, pl. 1, figs. 4–5. Kinderhook.

—— **varicella** Hall, 1888; Pal. New York, vol. 7, p. 135, pl. 24, figs. 29–31. Upper Helderberg.

Phillipsia Portlock, 1843; Rept. Geol. Londonderry, etc., p. 315.
Type, ***Phillipsia gemmulifera*** Phillips.

Dr. Henry Woodward suggests (Geol. Mag., vol. 10, 1883) the following brief diagnosis of the characters of the genera *Phillipsia* and *Griffithides*, which may be found useful in separating the genera:

	Phillipsia.	Griffithides.
1	Sides of the glabella nearly parallel	Glabella pyriform.
2	Marked by either two or three short lateral furrows.	No short lateral furrows on the glabella.
3	Basal lobes continuous with the glabella	Basal lobes distinct from the glabella.
4	Eyes large, reniform	Eyes small, suboval.

—— *bufo*. (See **Griffithides bufo.**)

—— **cliftonensis** Shumard, 1858; Trans. Acad. Nat. Sci. St. Louis, vol. 1, p. 227. Coal Measures.

—— **cliftonensis** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 11.

—— **cliftonensis** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 84.

—— ? **consors** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 53, pl. 1, figs. 16 a, b, c. Keokuk or Burlington.

—— **consors** Herrick, 1890; American Geologist, vol. 5, p. 254.

—— ? *coronata*. (See **Cyphaspis coronata** Hall.)

—— *doris* (Hall) Winchell, 1865; Proc. Acad. Nat. Sci. Phila., 2d series, vol. 9, p. 133. (See **Proteus doris** Hall.)

—— **howi** Billings, 1863; Canadian Naturalist, vol. 8, p. 209, figure. Carboniferous.

—— **howi** Dawson, 1868; Acadian Geology, p. 313, fig. 133.

—— **howi** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 63.

—— **howi** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 91.
Compare ***Phillipsia meramecensis.***

—— **insignis** Winchell, 1863; Proc. Acad. Nat. Sci. Phila., 2d series, vol. 7 p. 24. Burlington.

—— **insignis** Billings, 1863; Canadian Naturalist, vol. 8, p. 209.

—— **insignis** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 63.

Phillipsia insignis Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 87.

— *lævis.* (See **Cyphaspis lævis.**)

— **major** Shumard, 1858; Trans. Acad. Sci. St. Louis, vol. 1, p. 226. Coal Measures.

— **major** Meek, 1872; U. S. Geol. Survey Territories, Final Rept. Nebraska, p. 238, pl. 3, figs. 2 a, b, c.

— **major** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 60.

— **major** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 85, pl. 3, fig. 14.

— **meramecansis** Shumard, 1855; 1st and 2d Rept. Geol. Survey Missouri, p. 199, pl. B, fig. 9. Archimides Limestone.

— **meramecansis** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 59.

— **meramecansis** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 86, pl. 3, fig. 15.

Syn., *meramecansis?* Winchell, 1863; Proc. Acad. Nat. Sci. Phila., 2d series, vol. 7, p. 24. Keokuk.

— **meramecansis** Herrick, 1888; Bull. Denison Univ., vol. 3, p. 28, pl. 11, fig. 3.

Syn., *howi* (Billings) Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 92.
vindobonensis (Hartt) Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 92.

— **meramecansis** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 54, pl. 1, fig. 6.

— *minuscula* Hall. (See **Cyphaspis minuscula.**)

— **missouriensis** Shumard, 1858; Trans. Acad. Sci. St. Louis, vol. 1, p. 220. Coal Measures.

— **missouriensis** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 59.

— **missouriensis** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 86, pl. 3, figs. 1, 2, 14, 16.

— ? *ornatus.* (See **Cyphaspis coronata.**)

— [*Griffithides*] *portlocki* Meek and Worthen. (See **Griffithides portlocki.**)

— **perannulata** Shumard, 1858; Trans. Acad. Sci. St. Louis, vol. 1, p. 296, pl. 11, fig. 10. Permian.

— **perannulata** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 84.

— **præcursor** Herrick, 1888; Bull. Denison Univ., vol. 3, p. 29, pl. 12, fig. 1. Kinderhook.

— **præcursor** Herrick, 1890; American Geologist, vol. 5, p. 254.

— [*Proetus*] **præcursor** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 54, pl. 1, fig. 1. Waverly.

— **rockfordensis** Winchell, 1865; Proc. Acad. Nat. Sci. Phila., 2d series, vol. 9, p. 133. Kinderhook.

— **rockfordensis** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 62.

— **rockfordensis** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 91.

— **sampsoni** Vogdes, 1888; Trans. New York Acad. Sci., vol. 7, p. 248, figure. Waverly.

— [*Griffithides*] *sangamonensis* Meek and Worthen. (See **Griffithides sangamonensis.**)

— [*Griffithides*] *scitula* Meek and Worthen. (See **Griffithides scitula.**)

— **serraticaudata** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 52, pl. 1, figs. 8 a–d. Keokuk.

— **serraticaudata** Herrick, 1890; American Geologist, vol. 5, p. 254.

— *shumardi.* (See **Proetus auriculata.**)

— **stevensoni** Meek, 1871; Rept. Regents Univ. West Virginia, p. 73. Chester.

— **stevensoni** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 88, pl. 3, fig. 6.

— **tuberculata** Meek and Worthen, 1870; Proc. Acad. Nat. Sci. Phila., p. 52. Burlington.

— **tuberculata** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 92.

— **trinucleata** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 64, pl. 1, figs. 23, 23 a, c, e, h; pl. 2, fig. 32; pl. 3, fig. 21. Coal Measures.

Phillipsia trinucleata Herrick, 1889; Bull. Denison Univ., vol. 4, p. 49.

Syn., *Proetus trinucleatus* Vogdes, 1888; Annals New York Acad. Sci., vol. 4, p. 81 (in error), pl. 2, figs. 7, 8, 9.

vindobonensis Hartt, 1868; Acadian Geology, p. 353. Carboniferous.

vindobonensis Herrick, 1887; Bull. Denison Univ., vol. 2, p. 63.

—— *vindobonensis* Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 89. (See **Phillipsia meramecansis** Shumard.)

Piliolites Cozzens, 1846; Annals Lyceum Nat. Hist. New York, vol. 4, p. 157.

—— *ohioensis* Cozzens, 1846; Annals Lyceum Nat. Hist. New York, vol. 4, p. 157, pl. 16, figs. 1 a, 1 b. (See **Proetus crassimarginatus** ?)

Proetus Steininger, 1831; Mém. Soc. Géol. France, vol. 1, p. 355, pl. 24, fig. 6.

Type, *Proetus cuvieri* Steininger.

Syn., *Æonia* Burmeister, 1843; Organization Trilobites, p. 116 (Ray Soc. ed., p. 100). Burmeister separates Dalman's species *Calymene concinna* from the type of the genus *Proetus*, and gives a generic description of *Æonia*, with descriptions and figures of *A. concinna*, *A. stokesii*, and *A. verticalis*.

Phæton Barrande, 1846; Notice Prélim., p. 62. The author herein gives the new generic term *Phæton* for species of *Proetus* with fimbriated pygidia.

Prinopeltis Corda, 1847; Prodr., p. 121. New generic name proposed for the preoccupied term of *Phæton*.

Xiphogonium Corda, 1847; Prodr., p. 70. Proposed genus for certain species of *Proetus*, with nine segments in the thorax.

Goniopleura Corda, 1847; Prodr., p. 80. This genus includes such species as *Proetus elegantulus* Loven, with twelve segments in the thorax.

Forbesia McCoy, 1847; Sil. Foss. Ireland, p. 46. This author uses for the types of his genus *Forbesia latifrons* and *F. stokesii*, which is the same as that used by Barrande in 1846 for his genus *Phæton* and *Angelin* in 1878 for the genus *Phæthonides*.

Gerastos Goldfuss, 1843; Neues Jahrbuch für Mineral., p. 557. This genus is a *Proetus* with *G. lævigatus* for its type, a species identical with *Proetus cuvieri* Stein.

Trigonaspis and *Cylindraspis* the Brothers Sanderberger; Verst. d. Rhein, Scht.-Syst., p. 30, pl. 3, 1850.

Dechenella Kayser, 1880; Zeitschr. Deutsch. geol. Gesell., Berlin, 1880, p. 703. For such species as *Proetus verticallis* and *P. haldemani*.

—— **alaricus** Billings, 1860; Canadian Naturalist, vol. 5, p. 68, fig. 12. Hudson.

—— **alaricus** Billings, 1863; Geol. Canada, p. 219, fig. 230.

—— **angustifrons** Hall, 1861; Des. New Species Foss., p. 70. Schoharie.

—— **angustifrons** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 98.

—— **angustifrons** Hall, 1876; Illus. Devonian Foss. Crust., pl. 20, figs. 1, 4, 7.

—— **angustifrons** Hall, 1888; Pal. New York, vol. 7, p. 91, pl. 20, figs. 1–5; pl. 22, figs. 1–3.

—— *auriculatis*. (See **Proetus missouriensis** Shumard.)

—— **canaliculatus** Hall, 1861; Des. New Species Foss., p. 73. Upper Helderberg.

—— **canaliculatus** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 101.

—— **canaliculatus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 20, figs. 10, 11.

—— **canaliculatus** Hall, 1888; Pal. New York, vol. 7, p. 107, pl. 20, figs. 10, 11; pl. 23, figs. 10, 11.

—— **clarus** Hall, 1861; Des. New Species Foss., p. 71. Upper Helderberg.

—— **clarus** Hall, 1862; 15th Rept. New York State Mus. Nat. Hist., p. 99.

—— **clarus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 20, figs. 12–14.

—— **clarus** Hall, 1888; Pal. New York, vol. 7, p. 104, pl. 20, figs. 12–14; pl. 22, figs. 28–30.

—— **conradi** Hall, 1861; Des. New Species Foss., p. 69. Schoharie.

Proetus conradi Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 97.

—— **conradi** Hall, 1876; Illus. Devonian Foss. Crust., pl. 21, fig. 6 (not figs. 5, 8, 9); pl. 21, figs. 27, 28.

Syn., *Conradi* Hall, 1876; Illus. Devonian Foss. Crust., pl. 20, figs. 5, 8, 9.

Piliolites ohionensis? Cozzens, 1846; Annals Lyceum Nat. Hist. New York, vol. 7, p. 99, pl. 10, figs. 1 a, b.

—— **conradi** Hall and Clarke, 1888; Pal. New York, vol. 7, p. 89, pl. 20, fig. 9; pl. 21, figs. 27, 28; pl. 12, fig. 4.

—— [*Asaphus*] **corycœus** Conrad, 1842; Jour. Acad. Nat. Sci. Phila., vol. 8, p. 277, pl. 16, fig. 15. Niagara.

—— [*Asaphus*] **corycœus** Hall, 1843; Geol. New York, 4th Geol Dist, pl. 19, fig. 3.

—— **corycœus** Hall, 1852; Pal. New York, vol. 2, p. 315, pl. 67, fig. 15.

—— [*Calymene*] **crassimarginatus** Hall, 1843; Geol. New York, 4th Geol. Dist., p. 172, fig. 5. Upper Helderberg.

—— **crassimarginatus** Hall, 1859; 12th Rept. New York State Cab. Nat. Hist., p. 88.

—— [*Phillipsia*] **crassimarginatus** Billings, 1861; Canadian Journal, vol. vi, p. 362.

—— **crassimarginatus** Hall, 1861; Des. New Species Foss., p. 72.

—— **crassimarginatus** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 100, pl. 10, fig. 10.

—— **crassimarginatus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 20, figs. 20–31.

—— **crassimarginatus** Hall, 1888; Pal. New York, vol. 7, p. 99, pl. 20, figs. 6–8, 20–31; pl. 22, figs. 20–62; pl. 25, fig. 8.

—— **curvimarginatus** Hall, 1888; Pal. New York, vol. 7, p. 94, pl. 22, figs. 13–19. Schoharie.

—— *davenportensis* Barris. (See **Proetus prouti** Shumard.)

—— **dephinulus** Hall, 1888; Pal. New York, vol. 7, p. 111, pl. 23, figs. 1, 2; pl. 25, fig. 6. Upper Helderberg.

—— **denticulatus** Meek, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 49, pl. 1, figs. 10 a, b. Devonian.

—— **determinatus** Foerste, 1887; Bull. Denison Univ., vol. 2, p. 91, pl. 8, figs. 2, 3, 3 a. Clinton.

—— **doris** Hall, 1860; 13th Rept. New York State Cab. Nat. Hist., p. 112. Goniatite limestone.

—— [*Phillipsia*] **doris** Winchell, 1865; Proc. Acad. Nat. Sci. Phila., 2d series, vol. 2, p. 62.

—— [*Phillipsia*] **doris** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 62.

—— [*Phillipsia*] **doris** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 90 (in error).

—— **ellipticus** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., p. 267. Kinderhook.

—— **ellipticus** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 460, pl. 14, fig. 3.

—— **ellipticus** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 82, pl. 3, fig. 3.

—— **folliceps** Hall, 1888; Pal. New York, vol. 7, p. 101, pl. 23, figs. 3–8. Upper Helderberg.

—— *granulatus* Wetherby. (See **Griffithides granulatus.**)

—— **haldemani** Hall, 1861; Des. New Species Foss., p. 74. Hamilton.

—— **haldemani** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 102, pl. 10, fig. 6.

—— **haldemani** Hall, 1876; Illus. Devonian Foss. Crust., pl. 21, figs. 7–9.

—— **haldemani** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 210.

—— **haldemani** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 55, pl. 1, fig. 12.

—— **haldemani** Hall, 1888; Pal. New York, vol. 7, p. 113, pl. 21, figs. 7–9; pl. 23, figs. *13–15.*

Proetus [*Dechenella*] **haldemani** Kayser, 1880; Zeitschr. Deutsch. geol. Gesell., Berlin, 1880, p. 770, pl. 27, fig. 9.

—— [*Dechenella*] **haldemani** Tschernyschew, 1887; Mém. Comité Geol., vol. 3, No. 3, p. 14, pl. 1, fig. 9.

—— **hesione Hall, 1861**; Des. New Species Foss., p. 70. Schoharie.

—— **hesione Hall, 1862**; 15th Rept. New York State Cab. Nat. Hist., p. 98.

—— **hesione Hall, 1876**; Illus. Devonian Foss. Crust., pl. 20, figs. 15, 16.

—— **hesione** Hall, 1888; Pal. New York, vol. 7, p. 93, pl. 20, figs. 15, 16.

—— **jejunus** Hall, 1888; Pal. New York, vol. 7, p. 124, pl. 25, fig. 7. Hamilton.

—— **junius** Billings, 1863; Proc. Portland Soc. Nat. Hist., vol. 1, p. 122, pl. 1, fig. 23. Upper Silurian.

—— **latimarginatus** Hall, 1888; Pal. New York, vol. 7, p. 97, pl. 22, figs. 7–12. Schoharie.

—— **loganensis** Hall and Whitfield, 1877; U. S. Geol. Expl., 40th Par., vol. 4, p. 264, pl. 4, fig. 33. Waverly.

—— **loganensis** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 78.

—— **longicaudus** Hall, 1861; Des. New Species Foss., p. 80. Hamilton.

—— **longicaudus** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 108, pl. 10, figs. 7–9.

—— **longicaudus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 20, figs. 32–34.

—— **longicaudus** Williams, 1881; Am. Jour Sci., 3d series, vol. 21, p. 156.

—— (?) **longicaudus** Hall, 1888; Pal. New York, vol. 7, p. 131, pl. 20, figs. 32–34.

—— **macrobius** Billings, 1863; Proc. Portland Soc. Nat. Hist., vol. 1, p. 123, pl. 1, fig. 24. Upper Silurian.

—— **macrocephalus** Hall, 1861; Des. New Species Foss., pp. 77, 79. Hamilton.

—— **macrocephalus** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., pp. 105, 107.

—— **macrocephalus** Hall, 1876; Illus. Devonian Foss. Crust., pl. 21, figs. 10–21.

—— **macrocephalus** Hall, 1888; Pal. New York, vol. 7, p. 116, pl. 21, figs. 10–21; pl. 23, fig. 30.

—— [*Calymene*] **marginalis** Conrad, 1839; Ann. Rept. Pal. Dept. New York Geol. Survey, p. 66. Tully Limestone.

—— **marginalis** Hall, 1861; Des. New Species Foss., p. 76. Hamilton.

—— **marginalis** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 104.

—— **marginalis** Hall, 1876; Illus. Devonian Foss. Crust., pl. 21, figs. 24–28.

—— **marginalis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 210.

—— **marginalis** Hall, 1888; Pal. New York, vol. 7, p. 122.

—— **microgemma** Hall, 1888; Pal. New York, vol. 7, p. 109, pl. 22, figs. 33, 34. Upper Helderberg.

—— **minuscula** Hall, 1876; Illus. Devonian Foss. Crust., pl. 20, fig. 17.

—— **minutus** Herrick, 1889; Bull. Denison Univ., vol. 4, p. 56, pl. 1, figs. 7 a, b. Kinderhook.

—— **minutus** Herrick, 1890; American Geologist, vol. 5, p. 254.

—— **missouriensis** Shumard, 1855; 1st and 2d Rept. Geol. Missouri, p. 196, pl. B, figs. 13 a, b. Waverly.

Syn., *auriculatus* Hall, 1861; Des. New Species Foss., p. 79.
auriculatus Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 107.
[*Phillipsia* (*Proetus*)] *auriculatus* Herrick, 1889; Bull. Denison Univ., vol. 4, p. 34, pl. 1, fig. 14.
[*Phillipsia*] *shumardi* Herrick, 1887; Bull. Denison Univ., vol. 2, pp. 58, 60, pl. 7, fig. 14.

—— **missouriensis** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 75, pl. 3, fig. 1.

—— **missouriensis** *Hall, 1888*; Pal. New York, vol. 7, p. 133, pl. 23, fig. 32.

Proetus occidens Hall, 1861; Des. New Species Foss., p. 80. Hamilton.
—— **occidens** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 108.
—— **occidens** Hall, 1876; Illus. Devonian Foss. Crust., pl. 21, figs. 22, 23.
—— **occidens** Hall, 1888; Pal. New York, vol. 7, p. 130, pl. 21, figs. 22, 23.
—— **ovifrons** Hall, 1888; Pal. New York, vol. 7, p. 110, pl. 22, figs. 31, 32. Upper Helderberg.
—— **pachydermatus** Barrett, 1873; Am. Jour. Sci., 3d series, vol. 15, p. 370. Niagara.
—— **parviusculus** Hall, 1872; 24th Rept. New York State Cab. Nat. Hist., p. 223, pl. 8, fig. 14. Hudson.
—— **parviusculus** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 109, pl. 4, fig. 18.
—— **parviusculus** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 144.
—— **peroccidens** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Pal., vol. 4, p. 262, pl. 4, figs. 28–32. Waverly.
—— **peroccidens** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 79.
—— **phocion** Billings, 1874; Pal. Foss., vol. 2, p. 63, fig. 31. Devonian.
—— **phocion** Hall, 1888; Pal. New York, vol. 7, p. 125, pl. 25, figs. 9, 10.
—— **planimarginatus** Meek, 1871; Proc. Acad. Nat. Sci. Phila., p. 89. Corniferous.
—— **planimarginatus** Meek, 1873; Pal. Ohio, vol. 1, p. 233, pl. 23, figs. 3 a, b.
—— **planimarginatus** Hall, 1888; Pal. New York, vol. 7, p. 112, pl. 23, fig. 12.
—— **protuberans** Hall, 1859; Pal. New York, vol. 3, p. 351, pl. 73, figs. 5–8. Lower Helderberg.
—— **prouti** Shumard, 1863; Trans. Acad. Sci. St. Louis, vol. 2, p. 110. Hamilton.
Syn., *davenportensis* Barris, 1878; Proc. Davenport Acad. Sci., vol. 2, p. 287, pl. 11, fig. 8 (pl. 11, fig. 8, revised).
—— **prouti** Hall, 1888; Pal. New York, vol. 7, p. 126, pl. 23, figs. 16–18.
—— [*Calymene*] **rowi** Le Row, 1837; Poughkeepsie Telegram, Nov. 22. Hamilton.
—— [*Calymene*] **rowi** Green, 1838; Am. Jour. Sci., 1st series, vol. 33, p. 406.
—— [*Calymene*] **rowi** Green, 1838; Annals Mag. Nat. Hist., 1st series, London, vol. 1, p. 79.
—— **rowi** Hall, 1861; Des. New Species Foss., p. 75.
—— **rowi** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 103.
—— **rowi** Hall, 1876; Illus. Devonian Foss. Crust., pl. 21, figs. 2–6.
—— **rowi** Hall, 1888; Pal. New York, vol. 7, p. 119, pl. 21, figs. 2–6, 24–26; pl. 23, figs. 20–29.
—— [*Phillipsia*] **shumardi** Herrick, 1887; Bull. Denison Univ., vol. 2, pp. 58, 69, pl. 7, figs. 14 a, b. Waverly.
—— [*Phillipsia*] **shumardi** Herrick, 1888; Bull. Denison Univ., vol. 3, p. 29.
—— **spurlocki** Meek, 1872; Am. Jour. Sci., 3d series, vol. 3, p. 426. Hamilton.
—— **spurlocki** Meek, 1873; Pal. Ohio, vol. 1, p. 161, pl. 14, fig. 12.
—— **spurlocki** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 145.
—— **stenopyge** Hall, 1888; Pal. New York, vol. 7, p. 110, pl. 22, fig. 27. Upper Helderberg.
—— **stokesi** (Murch.) Hall, 1852; Pal. New York, vol. 2, p. 316, pl. 67, figs. 13, 14. Niagara.
—— **swallowi** Shumard, 1855; 1st and 2d Rept. Geol. Survey Missouri, p. 196, pl. B, figs. 12 a, b. Waverly.
—— [*Phillipsia*] **swallowi** Herrick, 1887; Bull. Denison Univ., vol. 2, p. 58.
—— [*Phillipsia*] **tennesseensis** Winchell, 1869; Geol. Tennessee, p. 445. Waverly.
—— **tennesseensis** Vogdes, 1887; Annals New York Acad. Sci., vol. 4, p. 80.
—— **tumidus** Hall, 1888; Pal. New York, vol. 7, p. 113, pl. 23, fig. 9. Upper Helderberg.
—— **verneuilli** Hall, 1861; Des. New Species Foss., p. 73. Upper Helderberg.
—— **verneuilli** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 101.
—— ***verneuilli*** *Hall, 1876;* Illus. Devonian Foss. Crust., p. 20, figs. 18, 19.

Proetus verneuilli Hall, 1888; Pal. New York, vol. 7, p. 108, pl. 20, figs. 18, 19.

Protichnites Owen, 1852; Quart. Jour. Geol. Soc. London, vol. 8, p. 214.

—— **alternans** Owen, 1852; Quart. Jour. Geol. Soc. London, vol. 8, p. 221, pl. 8 a, fig. 7. Potsdam.

—— **carbonarius** Dawson, 1873; Am. Jour. Sci., 3d series, vol. 5. Coal Measures.

—— **latus** Owen, 1852; Quart. Jour. Geol. Soc. London, vol. 8, p. 218, pl. 11. Potsdam.

—— **lineatus** Owen, 1852; Quart. Jour. Geol. Soc. London, vol. 8, p. 220, pl. 8 a, pl. 13. Potsdam.

—— **logananus** Marsh, 1869; Am. Jour. Sci., 2d series, vol. 48, p. 46. Potsdam.

—— **multinotatus** Owen, 1852; Quart. Jour. Geol. Soc. London, vol. 8, p. 219, pl. 12. Potsdam.

—— **octo-notatus** Owen, 1852; Quart. Jour. Geol. Soc. London, vol. 8, p. 217, pl. 10. Potsdam.

—— **septem-notatus** Owen, 1852; Quart. Jour. Geol. Soc. London, vol. 8, p. 214, pl. 9. Potsdam.

Protypus Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 211.

—— [*Angelina*] **hitchcocki** Whitfield, 1884; Bull. Am. Mus. Nat. Hist., New York, vol. 1, p. 148, pl. 14, fig. 13. Potsdam.

—— **hitchcocki** Walcott 1886; Bull. U. S. Geol. Survey, No. 30, p. 211, pl. 31, fig. 4.

—— [*Bathyurus*] **senectus** Billings, 1861; Geol. Vermont, vol. 2, p. 953, figs. 359, 360. Middle Cambrian.

—— [*Bathyurus*] **senectus** Billings, 1861; Pamphlet published in adv. Pal. Foss. Canada, p. 15, figs. 20, 21.

—— [*Bathyurus*] **senectus** Billings, 1863; Geol. Canada, p. 286, figs. 293 a, b.

—— [*Bathyurus*] **senectus** Billings, 1865; Pal. Foss., vol. 1, p. 15, figs. 20, 21.

—— **senectus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 213, pl. 31, figs. 2, 2 a–c.

Pterocephalia Roemer, 1852; Kreid. von Texas, p. 93.

—— [*Conocephalites* (*Pterocephalia*)] **laticeps** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., vol. 4, p. 221, pl. 2, figs. 4–7. Potsdam.

—— [*Ptychoparia* (*Pterocephalia*)] **laticeps** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 69.

—— [*Ptychoparia* (*Pterocephalia*)] **occidens** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 58, pl. 9, fig. 21. Cambrian.

—— **sancti-sabæ** Roemer, 1849; Texas, p. 421. Potsdam.

—— **sancti-sabæ** Roemer, 1852; Kreid. von Texas, p. 93, pl. 11.

Ptychaspis Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 170.

Type, *Ptychaspis miniscaensis* Hall.

—— **barabuensis** Winchell, 1864; Am. Jour. Sci., 2d series, vol. 37, p. 230. Potsdam.

—— [*Arionellus*] **cylindricus** Billings, 1865; Pal. Foss., vol. 1, p. 406, fig. 385.

—— [*Conoceph.* (*Ptychaspis?*)] **explanatus** Whitfield, 1880; Ann. Rept. Geol. Survey Wisconsin, 1879, p. 48. Potsdam.

—— [*Conoceph.* (*Ptychaspis?*)] **explanatus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 181, pl. 1, figs. 27, 28.

Syn., *granulosa* Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 173, pl. 6, figs. 33–41.

granulosa Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 34.

granulosa Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 185, pl. 1, fig. 24.

In this work *Ptychaspis granulosa* Hall (not Owen) is referred to *Ptychaspis striata*.

—— **granulosa** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 185, pl. 1, fig. 24.

Syn., *Dikelocephalus miniscaensis* Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 574, pl. 1, figs. 3, 12; pl. 1 a, figs. 4, 5.

—— [*Dikelocephalus*] **granulosus** Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 575, pl. 1, fig. 7. Potsdam.

Ptychaspis miniscaensis Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 171, pl. 6, figs. 41–46; pl. 10, figs. 21, 22.

—— **minuta** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 55. Potsdam.

—— **minuta** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 186, pl. 1, figs. 25, 26.

—— **minuta** Walcott, 1884; Pal. Eureka Dist., Mon. U. Geol. Survey, vol. 8, p. 60, pl. 10, fig. 23.

—— **pustulosa** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 223, pl. 2, fig. 27. Potsdam.

—— [*Dikelocephalus*] **sesostris** Billings, 1865; Pal. Foss., vol. 1, p. 198, fig. 184. Quebec.

—— **speciosus** Walcott, 1879; 32d Rept. New York State Mus. Nat. Hist., p. 131. Calciferous.

—— **striata** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 55. Potsdam.

—— **striata** Whitfield, 1880; Ann. Rept. Geol. Survey Wisconsin, 1879, p. 51.

—— **striata** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 186.

Syn., *granulosa* Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 173, pl. 6, figs. 33–40.

—— [*Arionellus*] **subclavatus** Billings, 1860; Canadian Naturalist, vol. 5, p. 315, figs. 15, 15 a. Quebec.

Ptychoparia Corda, 1847; Prodr., p. 141, pl. 2, fig. 11.

Type, *Ptychoparia striatus* Emmrich.

—— [*Conocephalites*] **adamsi** Billings, 1861; Pamphlet published in adv. Pal. Foss., p. 12, figure.

—— [*Conocephalus*] Adams, 1848; Am. Jour. Sci., 2d series, vol. 5, p. 109.

—— [*Conocephalites*] **adamsi** Billings, 1861; Geol. Vermont, vol. 2, p. 950, fig. 355.

—— [*Conocephalus*] Billings, 1861; Am. Jour Sci., 2d series, vol. 32, p. 231.

—— [*Conocephalus*] Billings, 1861; Canadian Naturalist, vol. 6, p. 324.

—— [*Conocephalites*] **adamsi** Billings, 1863; Geol. Canada, p. 286, fig. 294.

—— [*Conocephalites*] **adamsi** Billings, 1865; Pal. Foss., vol. 1, p. 12, fig. 15.

—— **adamsi** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 195, pl. 26, figs. 1, 1 a–c. Middle Cambrian.

Syn., *arenosus* (Billings) Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 195.

—— [*Euloma?*] **affinis** Walcott, 1882; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 54, pl. 10, fig. 12. Cambrian and Silurian.

—— [*Crepicephalus* (*Bathyurus*)] **angulatus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 220, pl. 2, fig. 28. Potsdam.

—— ? **angulatus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 269.

—— ? **annectans** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 91, pl. 12, fig. 18. Cambrian.

—— [*Crepicephalus* (*Loganellus*)] **anytus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par. vol. 4, p. 219, pl. 2, figs. 19–21. Potsdam.

—— **anytus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 56, pl. 9, fig. 26.

—— [*Lisostracus*] **anytus** Brögger, 1886; Geol. Fören. Stock. Förhandl., vol. 8, p. 212.

—— [*Conoceph.*] **antiquatus** Salter, 1859; Quart. Jour. Geol. Soc. London, vol. 15, p. 554, fig. 2. Potsdam.

Syn., [*Conoceph.*] *arenosus* Billings, 1861; Geol. Vermont, vol. 2, p. 952, fig. 358.
[*Conoceph.*] *arenosus* Billings, 1861; Pamphlet published in advance of Pal. Foss. Canada, vol. 1; also, Pal. Foss., vol. 1, p. 15, fig. 18.
[*Conoceph.*] *arenosus* Billings, 1863; Geol. Canada, p. 286, fig. 297.

Walcott (Bull. U. S. Geol. Survey, No. 30, p. 195) refers this species to *Ptychoparia adamsi.*

Ptychoparia [*Conoceph.*] *aurora* Hartt, 1868; Acadian Geology, p. 653. (See **Ptychoparia ouangondianus.**)

—— [*Conoceph.*] **billingsi** Shumard, 1861; Am. Jour. Sci., 2d series, vol. 32, p. 219. Potsdam.

—— [*Conoceph. ?*] **binodosus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 160, pl. 7, fig. 47. Potsdam.

—— [*Solenopleura ?*] **breviceps** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 49, pl. 10, fig. 9. Cambrian.

—— [*Conocephalites*] **calymenoides** Whitfield, 1878; Ann. Rept. Geol. Survey Wisconsin, 1877, p. 52. Potsdam.

—— [*Conocephalites*] **calymenoides** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 179, pl. 3, figs. 2–5.

—— **calymenoides** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 48.

—— [*Crepicephalus* (*Loganellus*)] **centralis** Whitfield, 1880; Geol. Resources Black Hills Dakota, p. 341, pl. 2, figs. 21–24. Potsdam.

—— [*Conocephalites*] **chippewaensis** (Owen) Shumard, 1863; Trans. St. Louis Acad. Sci., vol. 2, p. 104.

—— [*Lonchocephalus*] **chippewaensis** Owen, 1852; Rept. Geol. Survey Wisconsin, Iowa, and Minnesota, p. 576, pl. 8, figs. 6, 14; pl. 1 a, fig. 9.

—— ? (subgenus ?) **clavata** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 198, pl. 1, fig. 3. Cambrian.

—— [*Conoceph*] **cordilleræ** Rominger, 1887; Proc. Acad. Nat. Sci. Phila., p. 17, pl. 1, fig. 7. Cambrian.

—— **cordilleræ** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165.

—— [*Conoceph*] **depressus** Shumard, 1861; Am. Jour. Sci., 2d series, vol. 32, p. 219. Potsdam.

—— [*Conoceph*] **diadematus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 167, pl. 7, figs. 36–39; pl. 9, figs. 18–21 (?). Potsdam.

—— [*Euloma ?*] **dissimilis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 51, pl. 9, fig. 28. Cambrian.

—— [*Conoceph.* (*Arionellus ?*)] **dorsalis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 222. Potsdam.

—— [*Conoceph*] **elegans** Hartt, 1868; Acadian Geology, p. 650. St. John.

—— [*Conoceph*] **eos** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 151, pl. 7, figs. 24, 25; pl. 8, figs. 2–9. Potsdam.

—— **eos** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 51.

—— [*Conoceph.*] **eryon** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 157, pl. 7, figs. 10–16; pl. 8, figs. 16, 31. Potsdam.

—— **fitchi** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 197, pl. 1, fig. 6. Cambrian.

—— [*Conoceph.*] *formosus* Hartt. (See **Ptychoparia robbi** Hartt.)

—— [*Conoceph.* (*Ptychoparia*)] *gallatinensis* Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, 1872, p. 485. Potsdam.

Referred by Walcott to *Ptychoparia oweni* Meek and Hayden.

—— [*Crepicephalus* (*Loganellus*]) **granulosus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 214, pl. 2, figs. 1, 2, 3. Potsdam.

—— **granulosus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 57.

—— [*Crepicephalus* (*Loganellus*)] **haguei** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 210, pl. 2, figs. 14, 15. Potsdam.

—— **haguei** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 57.

—— [*Lisostracus*] **haguei** Brögger, 1886; Geol. Föreningens Stockholm Förhandl., vol. 8, p. 202.

—— [*Conoceph.*] *halli* Hartt. (See **Ptychoparia orestes** Hartt.)

Ptychoparia housensis Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 201, pl. 25, fig. 5. Middle Cambrian.

—— [*Conocoryphe* (*Concephalites*)] **kingii** Meek, 1870; Proc. Acad. Nat. Sci. Phila., vol. 22, p. 63.

—— [*Conocoryphe* (*Concephalites*)] **kingii** Meek, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 20, pl. 1, fig. 4.

—— [*Conocoryphe* (*Ptychoparia*)] **kingii** Meek, 1873; 6th Ann. Rept. U. S. Geol. Survey Territories, 1872, p, 487.

—— [*Conocoryphe* (*Ptychoparia*)] **kingii** White, 1876; U. S. Geog. and Geol. Surveys West 100th Mer., Palæont., vol. 4, p. 40, pl. 2, figs. 2 a, b, c.

—— [*Liostracus*] **kingii** Brögger, 1886; Geol. Föreningens Stockholm Förhandl., vol. 8, p. 205.

—— **kingii** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 193, pl. 27, figs. 4, 4 a. Middle Cambrian.

—— **læviceps** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 54, pl. 10, figs. 17, 18. Cambrian.

—— [*Conocephalites* (*Pterocephalus*)] **laticeps** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 67, 221, pl. 2, figs. 4–7. Cambrian.

—— [*Pterocephalus*] **laticeps** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 59.

—— ? **linnarssoni** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 47, pl. 9, figs. 18, 18 a. Cambrian.

—— [*Loganellus*] **logani** Devine, 1863; Canadian Naturalist, vol. 8, p. 95, figure. Potsdam.

—— [*Olenus*?] **logani** Billings, 1865; Pal. Foss., vol. 1, p. 201, figs. 185, 186.
Syn., [*Loganellus*] *quebecensis* Billings; *idem.*, p. 203.

—— **logani** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 36.

—— [*Crepicephalus* (*Loganella*)] **maculosus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 215, pl. 2, figs. 21, 25, 26 (?). Potsdam.

—— **maculosus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, pp. 269, 271.

—— [*Conoceph.*] **minor** Shumard, 1863; Trans. Acad. Nat. Sci. St. Louis, vol. 2, p. 105. Potsdam.

—— (Undet.) trilobite Owen, 1848; Geol. Reconnoissance Chippewa Land Dist., p. 15, pl. 7, fig. 4.

—— [*Conoceph.*] **minor** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 149, pl. 8, figs. 1–4.

—— **minor** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 91.

—— [*Conoceph.*] **minutus** Bradley, 1860; Am. Jour. Sci., 2d series, vol. 30, p. 24, 3 figs. Potsdam.

—— [*Conoceph.*] **minutus** Bradley, 1860; Canadian Naturalist, vol. 5, p. 420, figs. 1–3.

—— [*Conoceph.*] **minutus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 150, pl. 8, figs. 5–7.

—— **minutus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 91.

—— **minutus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 21.

—— [*Conoceph.*] **miser** Billings, 1861; New or little known Sil. Foss., p. 12, fig. 14. Potsdam.

—— [*Conoceph.*] **miser** Billings, 1861; Geol. Vermont, vol. 2, p. 950, fig. 354.

—— [*Conoceph.*] **miser** Billings, 1863; Geol. Canada, p. 286, fig. 393.

—— [*Conoceph.*] **miser** Billings, 1865; Pal. Foss., vol. 1, p. 12, fig. 14.

—— **miser** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 199, pl. 27, fig. 2.

—— [*Crepicephalus* (*Loganella*)] **montanensis** Whitfield, 1876; Rept. Recon. Upper Missouri, p. 141, pl. 1, figs. 1, 2. Potsdam.

—— **montanensis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, pp. 53, 56.

Ptychoparia mucronatus Shaler and Foerste, 1888; Bull. Mus. Comp. Zool. Harvard Coll., vol. 16, p. 37, pl. 2, fig. 21. Cambrian.

—— [*Conoceph.*] **nasutus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 155, pl. 7, figs. 3-9. Potsdam.

—— [*Conoceph.*] *neglectus.* (See **Ptychoparia tener**.)

—— [*Crepicephalus* (*Loganella*)] **nitidus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 212, pl. 2, figs. 8-10. Cambrian.

Syn., *Crepicephalus* [*Loganella*] *simulator* (Hall and Whitfield) Walcott.

—— **nitidus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 57.

—— **occidentalis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 51, pl. 10, fig. 5. Cambrian.

—— [*Conoceph.*] **orestes** Hartt, 1868; Acadian Geology, p. 649, fig. 225. St. John.

Syn., *Conoceph. halli* (Hartt) Walcott; Bull. U. S. Geol. Survey, No. 10, p. 40.
Conoceph. thersites (Hartt) Walcott; Bull. U. S. Geol. Survey, No. 10, p. 40.

—— **orestes var. thersites** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 40.

Syn., *orestes* Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 39, pl. 5, figs. 3, 3 a.

—— [*Solenopleura*] **orestes** Matthew, 1887; Trans. Royal Soc. Canada, vol. 4, p. 154. pl. 2, figs. 4 a-e.

—— [*Pterocephalus*] **occidens** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 58, pl. 9, fig. 21. Cambrian.

—— [*Conoceph.*] **ouangondiana** Hartt, 1868; Acadian Geology, p. 651, fig. 226. St. John.

—— **ouangondiana** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 37, pl. 5, figs. 4, 4 a-f.

—— **'ouangondiana var. aurora** (Hartt) Walcott; Bull. U. S. Geol. Survey, No. 10, p. 38, pl. 5, fig. 5.

—— [*Liostracus*] **ouangondiana** Matthew, 1887; Trans. Royal Soc. Canada, p. 138.

—— **oweni** (Meek and Hayden) Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 55, pl. 10, figs. 3, 3 a. (See **Agraulus oweni** Meek and Hayden.)

The following species are referred by Walcott (Mon. U. S. Geol. Survey, vol. 8, p. 55) to *Ptychoparia oweni:*

Arionellus oweni Meek and Hayden, 1862; Am. Jour. Sci., 2d series, vol. 33, p. 74.

Agraulos oweni Meek and Hayden, 1864; Pal. Upper Missouri, p. 9, figs. a-c, pl. 1, fig. 4.

Conocoryphe (*Ptychoparia*) *gallatinensis* Meek, 1870; 6th Ann. Rept. U. S. Geol. Survey Territories, 1872, p. 485.

Crepicephalus (*Loganella*) *centralis* Whitfield, 1880; Geol. Resources Black Hills, Dakota, p. 341, pl. 2, figs. 21-24.

—— [*Conoceph.*] **oweni** Hull, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 155, pl. 8, figs. 17-20. Potsdam.

—— [*Crepicephalus* (*Loganella*)] **planus** Whitfield, 1877; Prelim. Rept. Pal. Black Hills, p. 11. Potsdam.

—— [*Crepicephalus*] **planus** Whitfield, 1880; Geol. Black Hills Dakota, p. 343, pl. 2, fig. 20.

—— ? **pernasutus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 49, pl. 10, figs. 8, 8 a, b. Cambrian.

—— [*Conoceph.*] **perseus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 153, pl. 7, figs. 17-22; pl. 8, fig. 33. Potsdam.

—— **piochensis** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 201, pl. 26, fig. 2-2 a, b; pl. 28, figs. 1-1 a-e. Middle Cambrian.

—— ? **prospectensis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 46, pl. 9, fig. 20. Cambrian.

—— ? **prospectensis** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 202, pl. 27, fig. 5.

Ptychoparia quadrangularis Whitfield. The specific name of *Conoceph. quadratus* being preoccupied, Prof. R. P. Whitfield substitutes that of *quadrangularis* for the species.

—— [*Crepicepalus* (*Loganella*)] **quadrans** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., Vol. 4, p. 238, pl. 2, figs. 11-13.

—— **quadrans** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 199, pl. 29, figs. 4-4 a, b. Cambrian.

—— [*Conoceph.*] *quadratus*. (See **Ptychoparia quadrangularis.**)

—— [*Conoceph.*] **quadratus** Hartt, 1868; Acadian Geology, p. 654. St. John.

—— **quadratus** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 39, pl. 5, fig. 1.

—— [*Conoceph.?*] **quadratus** Whitfield, 1880; Ann. Rept. Geol. Survey, Wisconsin, 1879, p. 47.

—— [*Conoceph.?*] **quadratus** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 180, pl. 1, figs., 15, 16. (See **Ptychoparia quadrangularis** Whitfield.)

—— [*Conoceph.*] *robbi* Hartt, 1868; Acadian Geology, p. 648. St. John.
Syn., *Conoceph. formosa* (Hartt) Walcott; Bull. U. S. Geol. Survey, No. 10, p. 36.

—— *robbi* Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 36, pl. 6, figs. 1, 1 a.

—— [*Solenopleura*] robbi Matthew, 1887; Trans. Royal Soc. Canada, vol. 4, p. 153, pl. 2, figs. 3 a-l; fig. 4 a-e.

—— **rogersi** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 47, pl. 7, fig. 2. Lower Cambrian.

—— [*Conoceph.*] **shumardi** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 154, pl. 7, figs. 1-2; pl. 3, figs. 19, 32. Potsdam.

—— **similis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 52, pl. 10, figures. Cambrian.

—— **similis var. robustus** Walcott; *idem.*, p. 53, pl. 1, figs. 9, 9 a.

—— [*Conoceph.*] **subcoronatus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 237, pl. 2, fig. 1.

—— **subcoronatus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 205, pl. 28, fig. 4. Middle Cambrian.

—— [*Conoceph.*] **teucer** Billings, 1861; New or little known Sil. Foss., p. 12, fig. 16.

—— [*Conoceph.*] **teucer** Billings, 1861; Geol. Vermont, vol. 2, p. 951, fig. 356.

—— [*Conoceph.*] **teucer** Billings, 1865; Pal. Foss., vol. 1, p. 13, fig. 16.

—— [*Cenoceph.*] **teucer** Billings, 1863; Geol. Canada, p. 286, fig. 295.

—— **teucer** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 197, pl. 26, fig. 3. Middle Cambrian.

—— [*Conoceph.*] **tener** Hartt, 1868; Acadian Geology, p. 652. St. John.
Syn., *Conoceph. neglectus* (Hartt) Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 41.

—— **tener** Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 41, pl. 5, figs. 6, 6 a, b.

—— [*Conoceph.*] *thersites*. (See **Ptychoparia orestus** Hartt.)

—— *trilineatus*. (See **Atops trilineatus, Conocoryphe trilineatus, Conocephalites trilineatus, Calymene beckii, Triarthrus beckii.**)

—— [*Crepicephalus* (*Loganella*)] **unisulcatus** Hall and Whitfield, 1877; U. S. Geol. Expl. 40th Par., Palæont., vol. 4, p. 216, pl. 2, figs. 22, 23. Cambrian.

—— **unisulcatus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 58.

—— [*Conoceph.*] **verucosus** Whitfield, 1884; Bull Am. Mus. Nat. Hist., vol. 1, p. 146, pl. 14, fig. 12. Potsdam.

—— [*Conoceph.*] **vulcanus** Billings, 1861; New or little known Sil. Foss., p. 14, fig. 17.

—— [*Conoceph.*] **vulcanus** Billings, 1861; Geol. Vermont, vol. 2, p. 952, fig. 357.

—— [*Conoceph.*] **vulcanus** Billings, 1863; Geol. Canada, p. 286, fig. 296.

—— [*Conoceph.*] **vulcanus** Billings, 1865; Pal. Foss., vol. 1, p. 14, fig. 17.

Ptychoparia vulcanus Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 196, pl. 26, figs. 4, 4 a. Middle Cambrian.

Compare *Ptychoparia adamsi.*

—— [*Conoceph.*] **winona** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 161, pl. 7, figs. 26–28. Potsdam.

—— [*Conoceph.*] **zenkeri** Billings, 1860; Canadian Naturalist, vol. 5, p. 305, fig. 4. Quebec.

—— [*Conoceph.*] **zenkeri** Billings, 1865; Pal. Foss., vol. 1, p. 398, fig. 375.

Remopleurides Portlock, 1843; Rept. Geol. Londonderry, etc., p. 254.

Type, *Remopleurides colbii* Portlock.

Syn., *Caphyra* Barrande, 1846; Notice Prélim., p. 32.
Amphytryon Corda, 1847; Prodr., p. 228.

—— **affinis** Billings, 1865; Pal. Foss., vol. 1, p. 325, fig. 313. Quebec.

—— **canadensis** Billings, 1865; Pal. Foss., vol. 1, p. 182, fig. 164. Chazy.

—— **panderi** Billings, 1865; Pal. Foss., vol. 1, p. 293, fig. 283. Quebec.

—— ? **schlotheimi** Billings, 1865; Pal. Foss., vol. 1, p. 294, fig. 284. Quebec.

Syn., *Paradoxides* or *Olenellus* Billings, 1863; Geol. Canada, pp. 871, 872.

—— **striatulus** Walcott, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 347, fig. 27, 27 a, b. Trenton.

Sao Barrande, 1846; Notice Prélim. Syst. Sil. Bohême, p. 13.

—— ? **lamottensis** Whitfield, 1886; Bull. Am. Mus. Nat. Hist. New York, vol. 1, p. 334, pl. 33, figs. 9–11. Birdseye Limestone.

Shumardia Billings, 1862; Pal. Foss., vol. 1, p. 92.

Type, *Shumardia granulosa* Billings.

The generic name therein suggested by Mr. E. Billings for a minute Trilobite includes a specimen having an expanding glabella, with two anterior side nodules, simular to those of *Battus pusillus* Sar, the genus being allied to *Agnostus*, differing therefrom in having a regularly ribbed pygidium, similar to that of an *Asaphus*. Comparing Mr. E. Billings's type, *Shumardia granulosa*, with *Conophrys salopiensis* Galloway (Quart. Jour. Geol. Soc. London, vol. 33, p. 667, pl. 12, fig. 7), which W. C. Brögger (Sil. Etagen 2 und 3, p. 125) refers to as a synonym to *Battus pusillus*, we find a similar characteristic in the glabella. The pygidium of *Shumardia granulosa* has however a more semi-oval form, with a greater number of axis rings and an additional number of ribs on the side lobes.

The head of *Shumardia granulosa* differs from *Battus pusillus* in having a groove, which runs from the anterior front of the glabella to the frontal margin of the head, a characteristic of some species of *Agnostidæ* (*vid.* Brögger, Sil. Etagen 2 und 3, pl. 1, fig. 10).

Mr. Billings remarks "that in some specimens this furrow has at the bottom a small triangular tubercle, giving the glabella the appearance of having a projecting angular process in the middle of its front." I am more inclined to view this triangular tubercle as a point of attachment for the muscles of the jaws, and not as a process for the attachment of antennæ.

Mr. E. Billings in the same book gives a description of a second species, which he calls *Shumardia glacialis*, figured p. 283, fig. 270. The species is represented with three glabella furrows, and should not be included in the genus *Shumardia*.

If these forms are not embryonic, against which in the case of *Conophrys salopiensis* Mr. C. Callaway dissents on account of the constant size of the heads and the absence of the facial sutures amongst the larger specimens, I would advocate the acceptance of the new genus *Shumardia* amongst the *Agnostidæ* for such species as *Shumardia granulosa* and *Battus pusillus* to replace the latter generic term of *Conophrys*.

Solenopleura Angelin, 1854; Palæont. Scand., p. 26.

Type, *Solenopleura holometopa* Angelin.

Diagnosis: Glabella prominent, with three distinct furrows; fixed cheeks, elevated especially in the middle; front limb convex; occipital ring bearing a tubercle; genal angles pointed; thorax, pleuræ bluntly rounded; pygidium small with few segments; surface of shell granulated with or without scattered tubercles.

—— **acadia** Whiteaves, 1885; Trans. Royal Soc. Canada, vol. 3, p. 76, pl. 7, fig. 15. **Cambrian.**

—— **acadia** Whiteaves, 1887; Trans. Royal Soc. Canada, vol. 4, p. 157, pl. 2, figs. 5 a, b, c.

—— **acadia** var. **elongata** Matthew, 1887; *idem.*, p. 159, pl. 1, fig. 6.

—— **bombifrons** Matthew, 1886; Trans. Royal Soc. Canada, vol. 2, p. 156, figs. 5–5 a b. **St. John.**

—— **communis** Billings, 1874; Pal. Foss., vol. 2, p. 72. **Potsdam.**

—— **communis** Matthew, 1886; Trans. Royal Soc. Canada, vol. 2, p. 155, figs. 4–4 a, b.

—— **nana** Ford, 1878; Am. Jour. Sci., 3d series, vol. 15, p. 126. **Potsdam.**

—— **nana** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 214, pl. 27, fig. 3.

—— ? **nana** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 196, pl. 1, figs. 1–1 d. **Cambrian.**

—— **orestes** (Hartt) Matthew, 1887; Trans. Royal Soc. Canada, vol. 4, p. 154, pl. 2, figs. 4 a–e.

Syn., *robbi* (Hartt) Matthew, 1887; Trans. Royal Soc. Canada, vol. 4, p. 153, pl. 2, figs. 3 a–l and figs. 4 a–e. **St. John.**

—— ? **tumida** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 196, pl. 1, fig. 2, 2 a. **Cambrian.**

Sphærexochus Beyrich, 1845; Ueber einige böhmische Trilobiten, p. 19.

Type, *Sphærexochus mirus*.

—— **canadensis** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 64, fig. 21.

—— **mirus** (Beyrich) Roemer, 1860; Die Sil. Fauna W. Tennessee, p. 81, pl. 5, fig. 20. **Niagara.**

—— **parvus** Billings, 1865; Pal. Foss., vol. 1, p. 180, fig. 161. **Chazy and Trenton.**

—— **romingeri** Hall, 1862; Geol. Rept. Wisconsin, p. 434. **Niagara.**

Syn., *mirus* Hall (not Beyrich), 1867; 20th Rept. New York State Cab. Nat. Hist., p. 334, pl. 21, figs. 4–7.

—— **romingeri** Hall, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 375, pl. 22, figs. 4–7.

— **romingeri** Hall, 1870; 20th Rept. New York State Cab. Nat. Hist., p. 425, pl. 21, figs. 4–7 (rev. ed.).

—— **romingeri** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 311, pl. 21, figs. 1–3.

—— **romingeri** ? Hall; 28th Rept. New York State Mus. Nat. Hist., p. 32, pl. 32, fig. 16.

—— **romingeri** Meek and Worthen, 1875; Geol. Survey Illinois, vol. 6, p. 510, pl. 24, fig. 4.

Sphærocoryphe Angelin, 1854; Palæont. Scand., p. 65.

Type, *Sphærocoryphe dentata* Angelin.

—— **robustus** Walcott, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 273, figs. 18 a, b. **Trenton.**

—— **salteri** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 63.

Symphysurus Goldfuss, 1843; Jahrb. für Mineral., 1843, p. 552.

—— ? **goldfussi** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 95, pl. 12, fig. 16. **Pogonip.**

Telephus Barrande, 1852; Syst. Sil. Bohême, vol. 1, p. 890.

—— **americanus** Billings, 1865; Pal. Foss., vol. 1, p. 291, figs. 281. **Quebec.**

Terataspis **Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 223. (See *Lichas* and *Acidaspis*.)**

——*grandis*. (*See* **Lichas** [*Terataspis*] **grandis** Hall.)

Terataspis eriops. (See **Lichas** [*Conolichas*] **eriops** Hall.)

Thaleops Conrad, 1843; Proc. Acad. Nat. Sci. Phila., vol. 1, p. 332.

—— *ovatus* Conrad. (See **Illænus ovatus.**)

Triarthrella Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 177.

—— **auroralis** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 177, pl. 9, fig. 13. Potsdam.

Triarthrus Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 560 (June). Green, 1832; Mon. Tril. North America, p. 86.

Type, *Triarthrus beckii* Green.

—— **beckii** Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 560, pl. 1, fig. 3 (June).

—— **beckii** Green, 1832; Mon. Tril. N. A., p. 86, cast 34, pl. 1, fig. 3.

—— **beckii** Harlan, 1835; Trans. Geol. Soc. Penn., vol. 1, p. 205, pl. 15, fig. 6.

Syn., [*Paradoxides*] *triarthrus* Harlan, 1835; Trans. Geol. Soc. Penn., vol. 1, pl. p. 264, 15, fig. 5.

[*Paradoxides*] *arcuatus* Harlan, 1835; Trans. Geol. Soc. Penn., vol. 1, p. 265, pl. 15, figs. 1–3.

—— **beckii** Harlan, 1835; Med. Phys. Researches, p. 400, pl., fig. 6.

Syn., [*Paradoxides*] *triarthrus* Harlan, 1835; Med. Phys. Researches, p. 401, pl., fig. 5.

[*Paradoxides*] *arcuatus* Harlan, 1835; Med. Phys. Researches, p. 402, pl., figs. 1–3.

—— **beckii** Green, 1835; Suppl. Mon. Tril. N. A., p. vii.

—— [*Paradoxides*] **beckii** Hall, 1838; Am. Jour. Sci., 1st series, vol. 33, p. 142, fig. 2.

Syn., *Paradoxides eatoni* Hall, 1838; Am. Jour. Sci., 1st series, vol. 33, p. 142, fig. 2.

—— **beckii** Green, 1838; Am. Jour. Sci., 1st series, vol. 33, p. 344.

—— **beckii** Mather, 1842; Geol. New York, 1st Geol. Dist., p. 390, fig. 24 (1).

—— **beckii** Emmons, 1842; Geol. New York, 2d Geol. Dist., p. 399, fig. 110 (1).

—— **beckii** Vanuxem, 1843; Geol. New York., 3d Geol. Dist., p. 57, fig. 8 (1).

—— **beckii** Hall, 1843; Geol. New York, 4th Geol. Dist., p. 504.

—— [*Calymene*] **beckii** Hall, 1847; Pal. New York, vol. 1, p. 237, pl. 64, figs. 2 a–e.

—— [*Calymene*] **beckii** Hall, 1847; Pal. New York, vol. 1, p. 250, pl. 66, figs. 2 a–k (not pl. 67, figs. 4 a–e, *Atops trilineatus*).

Syn., *Atops trilineatus* (Emmons) Hall, 1847; Pal. New York, vol. 1, p. 237.

—— [*Calymene*] **becki** Hall, 1848; Am. Jour. Sci., 2d series, vol. 5, p. 322, figs. 1 a, b, 2 a–g.

—— **becki** Emmons, 1848; Am. Assoc. Adv. Sci., p. 17.

—— **beckii** Haldeman, 1848; Am. Jour. Sci., 2d series, vol. 8, p. 137.

—— **beckii** Emmons, 1855; Am. Geology, vol. 1, pt, 2, p. 214, pl. 15, fig. 12.

—— [*Calymene*] **beckii** Rogers, 1858; Geol. Survey Penn., vol. 2, p. 820, fig. 613.

—— **beckii** Barrande, 1861; Soc. Géol. France, 2d series, p. 269, pl. 5, figs. 11, 12.

—— **beckii** Logan, 1863; Geol. Canada, p. 202, fig. 200.

—— **beckii** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 146.

—— **becki** Walcott, 1876; Trans. Albany Inst., vol. 10, p. 23, pl. 2, figs. 1–16. Trenton.

—— [*Brongniartia*] **carcinodea** Eaton, 1832; Am. Jour. Sci., 1st series, vol. 22, p. 166 (March 6).

—— [*Brongniartia*] **carcinodea** Eaton, 1832; Geol. Text Book, p. 33, pl. 1, fig. 3.

—— **canadensis** Smith, 1861; Canadian Jour., vol. 6, p. 275. Hudson.

—— **fischeri** Billings, 1861; Pal. Foss., vol. 1, p. 291, fig. 280. Quebec.

—— **glaber** Billings, 1859; Canadian Naturalist, vol. 4, p. 382. Utica.

—— **glaber** Billings, 1863; Geol. Canada, p. 202, fig. 198.

—— **spinosus** Billings, 1859; Canadian Naturalist, vol. 4, p. 382. Trenton.

—— **spinosus** Billings, 1863; Geol. Canada, p. 202, fig. 199.

—— ***spinosus** Ami, 1882;* Trans. Ottawa Nat. Club, vol. for 1882–'83, p. 88, pl. 1, figure.

Triarthrus trimerus Green, 1832; Monthly Am. Jour. Geol., vol. 1, p. 560. (See **Homalonotus delphinocephalus** and **H. jacksoni.**)

Trinucleus Lhwyd, 1698; Lithophyacii Britannici Ichnographia, Epistola 1. Murchison, Silurian System, 1839, p. 659.

Sir R. I. Murchison has revived this old name of Lhwyd's from classical feelings, and all subsequent palæontologists have adopted it. Lhwyd's description meant no more than the general name of Trilobite of the more modern writers, and could not, except by courtesy, set aside Dr. Jacob Green's genus *Cryptolithus.*

—— **bellulus** Ulrich, 1878; Jour. Cincinnati Soc. Nat. Hist., vol. 1, p. 99, pl. 4, fig. 15.

—— [*Nuttainia*] **concentrica** Eaton, 1832; Geological Text Book, p. 34, pl. 1, fig. 2.

Syn., *Trilobite* Bigsby, 1825; Annals Lyceum Nat. Hist. New York, vol. 1, pt. 2, p. 214, pl. 15, fig. 1. Trenton and Hudson.

Cryptolithus tessellatus Green, 1832; Mon. Tril. N. A., p. 73, cast 38, pl. 1, fig. 4.

Cryptolithus tessellatus Green, 1832; Monthly Am. Jour. Geol., vol. 1, pl. 1, fig. 4.

—— **concentrica** Hall, 1847; Pal. New York, vol. 1, pp. 249, 255, pl. 65, figs. 4 a, b; pl. 67, figs. 1 a–h.

—— **concentrica** Emmons, 1855; Am. Geology, vol. 1, pt. 2, p. 212, pl. 17, fig. 1.

—— **concentrica** Chapman, 1858; Canadian Jour., vol. 3, p. 514.

—— **concentrica** Billings, 1861; Geol. Vermont, vol. 1, p. 300, fig. 215.

—— **concentrica** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 126.

Zacanthoides Walcott, 1887; Am. Jour. Sci., 3d series, vol. 36, p. 165.

Type, *Zacanthoides spinosus* Walcott.

—— [*Dicellocephalus?*] **flagricauda** White, 1874; Prelim. Rept. Invt. Foss. Geog. and Geol. Survey West 100th Mer., p. 12. Cambrian.

—— [*Dicellocephalus?*] **flagricauda** White, 1877; U. S. Geog. and Geol. Survey West 100th Mer., vol. 4, p. 60, pl. 3, figs. 8 a, b.

—— [*Olenoides*] **flagricauda** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 185, pl. 25, fig. 4.

—— **flagricauda** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165.

—— [*Olenoides*] **levis** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 187, pl. 25, figs. 3, 3 a. Cambrian.

—— **levis** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165.

—— [*Ogygia?*] **spinosus** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 63, pl. 9, fig. 22. Middle Cambrian.

—— [*Olenoides*] **spinosus** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 184, pl. 25, figs, 6, 6 a.

—— [*Embolimus*] **spinosus** (Rominger) Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 164.

—— **spinosus** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165.

—— [*Olenoides*] **typicalis** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 183, pl. 25, figs. 2, 2 a. Middle Cambrian.

—— **typicalis** Walcott, 1888; Am. Jour. Sci., 3d series, vol. 36, p. 165.

PART III.

CATALOGUE OF NON-TRILOBITES.

PART III.

NON-TRILOBITIC GENERA AND SPECIES.

MEROSTOMATA.

EURYPTERIDÆ.

EURYPTERUS De Kay, 1825; Annals Lyceum Nat. Hist., vol. 1, p. 375.
DOLICHOPTERUS Hall, 1859; Palæont. New York, vol. 3, p. 414.
ECHINOGNATHUS Walcott, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 213.
ADELOPHTHALMUS Jordan and Meyer, 1854; Crust. Steinkohl. Saarb., p. 8.
GLYPTOSCORPIUS Peach, 1880; Trans. Royal Soc. Edinb., vol. 30, p. 516.
ARTHROPLEURA Jordan and Meyer, 1854; Crust. Steinkohl. Saarb., p. 13.

PTERYGOTIDÆ.

PTERYGOTUS Agassiz, 1844; Mon. Poissons Foss., note, p. xix.
SLIMONIA Page, 1856; Advance Text-Book Geology, p. 135.
STYLONURUS Page, 1856; Advance Text-Book Geology.

SYNZIPHOSURA.

ACANTHOTELSON Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 46; Geol. Survey Illinois, vol. 2, 1866, p. 399.

XIPHOSURA.

CYCLIDÆ.

CYCLUS De Koninck, 1841; Mém. Acad. Sci. Belgique, vol. 14, p. 13.
DIPELTIS Packard, 1885; American Naturalist, vol. 19, p. 293.

BUNODIDÆ.

BUNODES Eichwald, 1854; Beiträge Geol. u. Pal. Russ., p. 131.
HEMISAPIS Woodward, 1865; Quart. Jour. Geol. Soc. London, vol. 21, p. 490.
EXAPINURUS Nieszkowski, 1859; Archiv Nat. Liv-, Esth- u. Kurl., vol. 1, p. 380.
PSEUDONISCUS Neiszkowski, 1859; Archiv Nat. Liv-, Esth- u. Kurl., vol. 1, p. 381.

LIMULIDÆ.

BELINURUS Koenig, 1820; Icones Foss. Sectiles, pl. 18, fig. 230.
PRESTWICHIA Woodward, 1887; Quart. Jour. Geol. Soc. London, vol. 23, p. 32.

LIMULUS Müller, 1785; Entomostraca, etc., p. 124.
PROTOLIMULUS Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 150.
NEOLIMULUS Woodward, 1868; Geol. Mag., vol. 5, p. 1.

PHYLLOPODA.

CERATIOCARIDÆ.

HYMENOCARIS Salter, 1852; Rept. 22d Meeting Brit. Assoc. Adv. Sci., Trans. Sec., p. 56.
CERATIOCARIS McCoy, 1849; Annals Mag. Nat. Hist. London, 2d series, vol. 4, p. 412.
ECHINOCARIS Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 34.
DIDYOCARIS Salter, 1860; Annals Mag. Nat. Hist. London, 3d series, vol. 5, p. 161.
DITHYOCARIS (Scouler) Portlock; Geol. Rept. Londonderry, etc., 1843, p. 313.
PROTOCARIS Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 50.
ELYMOCARIS Beecher, 1884; 2d Geol. Survey Penn., vol. PPP., p. 13.
TROPIDOCARIS Beecher, 1884; 2d Geol. Rept. Penn., vol. PPP., p. 15.
PHYSOCARIS Salter, 1860; Annals Mag. Nat. Hist. London, 3d series, vol. 5, p. 159.
PHASGANOCARIS Noväk, 1886; Sitzungsb. böhm. Gesell., 1886, p. 498.
ACANTHOCARIS Peach, 1882; Trans. Royal Soc. Edinb., vol. 30, p. 511.

DISCINOCARIDÆ.

DISCINOCARIS Woodward, 1866; Quart. Jour. Geol. Soc. London, vol. 22, p. 504.
SPATHIOCARIS Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 477.
PHOLADOCARIS Woodward, 1882; Geol. Mag., decade 3, vol. 9, p. 388.
ELLIPSOCARIS Woodward, 1882; Geol. Mag., decade 3, vol. 9, p. 444.
LISGOCARIS Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 478.
CARDIOCARIS Woodward, 1882; Geol. Mag., decade 3, vol. 9, p. 386.
DIPTEROCARIS Clarke, 1883; Am. Jour. Sci., 3d series, vol. 23, p. 121.
PTEROCARIS Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 464.
CRESCENTELLA Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 507.
APTYCHOPSIS Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 455.
PELTOCARIS Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 87.
PINNOCARIS Etheridge, 1878; Proc. Royal Phys. Soc., Edinb., vol. 4, p. 167.
PTYCHOCARIS Noväk, 1885; Sitzungsb. böhm. Gesell., 1885, p. 343.

RHINOCARIDÆ.

RHINOCARIS Clarke, 1888; Palæont. New York, vol. 7, p. lviii.
COLPOCARIS Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 334.
SOLENOCARIS Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335. Name should be changed, preoccupied by J. Young. See STRIGOCARIS.
MESOTHYRA Hall, 1888; Palæont. New York, vol. 7, pp. lvi, 187.
SACOCARIS Salter, 1868; Proc. Geol. Polytech. Soc., vol. 4, p. 588.
LINGULOCARIS Salter, 1866; Mem. Geol. Survey, vol. 3, pp. 252, 253, and 294.
SOLENOCARIS Young, 1868; Proc. Nat. Hist. Soc. Glasgow, vol. 1, p. 171.
ROSTROCARIS Kinnear, 1887; Trans. Edinb. Geol. Soc., vol. 5, p. 417.
CARYOCARIS Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 139.
ENTOMIDELLA Jones, 1873; Annals Mag. Nat. Hist., London, 4th series, vol. 11, p. 416.
ARCHÆOCARIS Meek, 1872; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335.
MYOCARIS Salter, 1864; Quart. Jour. Geol. Soc. London, vol. 20, 1864, p. 292.
ESTHERIA Rüppell, 1857; Mus. Senckenberg, vol. 2, p. 119.
LEAIA Jones, 1882; Mon. Fossil Estheria, p. 115.
SCHIZODISCUS Clarke, 1888; Palæont. New York, vol. 7, p. 207.

BIVALVED ENTOMOSTRACA.

CYPRIDINIDÆ.

Cypridina Milne-Edwards, 1838; Lamarck's Anim. s. Vert., vol. 5, p. 178.
Cypridinella Jones and Kirkby, 1874; Mon. Carboniferous Entom., p. 21.
Cypridellina Jones and Kirkby, 1874; Mon. Carboniferous Entom., p. 25.
Sulcuna Jones, 1873; Quart. Jour. Geol. Soc. London, vol. 29. p. 411.
Cyprella De Koninck, 1841; Mém. Acad. Royale Bruxelles, vol. 14, p. 19.
Bradycinetus Sars, 1865; Översigt af Norges Marine Ostracoder.
Philomedes Lilljeborg, 1853; Crust. in Scania Occurrentibus, p. 175.
Rhombina Jones and Kirkby, 1874; Mon. Carboniferous Entom., p. 43.

ENTOMOCONCHIDÆ.

Entomoconchus McCoy, 1839; Jour. Geol. Soc. Dublin, vol. 2, p. 91.
Offa Jones and Kirkby, 1874; Mon. Carboniferous Entom., p. 53.

POLYCOPIDÆ.

Polycope Sars, 1865; Översigt af Norges Marine Ostracoder.

ENTOMIDIDÆ.

Entomis Jones, 1861; Mem. Geol. Survey Scotland, Expl. map 32, p. 137.

CYTHERELLIDÆ.

Cytherella Jones and Bosquet, 1848 and 1852.
Cytherellina Jones and Holl, 1869; Annals Mag. Nat. Hist., London, 4th series, vol. 3, p. 215.
Cytherina Lamarck, 1818; Animaux sans Vert., vol. 5, p. 125.
Æchmina Jones and Holl, 1869; Annals Mag. Nat. Hist., London, 4th series, vol. 3, p. 217.

LEPERDITIDÆ.

Leperditia Rouault, 1851; Bull. Soc. Géol. France, 2d series, vol. 8, p. 377.
Bernix Jones, 1884; Proc. Berwickshire Nat. Club, vol. 10, p. 316.
Isochilina Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 248.
Primitia Jones and Holl, 1865; Annals Mag. Nat. Hist., London, 3d series, vol. 16, p. 416.
Beyrichia McCoy, 1846; Synopsis Sil. Foss. Ireland, p. 57.
Beyrichiella Jones and Kirkby, 1886; Geol. Mag., n. s., decade 3, vol. 3, p. 438.
Kirkbya Jones, 1869; Annals Mag. Nat. Hist., London, 4th series, vol. 3, p. 223.
Moorea Jones and Kirkby, 1867; Annals Mag. Nat. Hist., London, 4th series, vol. 3, p. 225.
Phreatura Jones and Kirkby, 1886; Quart. Jour. Geol. Soc. London, vol. 42, p. 507.
Strepula Jones and Holl, 1886; Annals Mag. Nat. Hist., London, 5th series, vol. 17, p. 403.
Bollia Jones and Holl, 1886; Annals. Mag. Nat. Hist., London, 5th series, vol. 17, p. 360.
Klœdinia Jones and Holl, 1886; Annals Mag. Nat. Hist., London, 5th series, vol. 17, p. 362.
Beyrichiopsis Jones and Kirkby, 1886; Geol. Mag., decade 3, vol. 3, p. 434.
Aparchites Jones, 1889; Annals Mag. Nat. Hist., 6th series, vol. 3, p. 385.
Primitopsis *Jones, 1887; Notes on some Sil. Ostracoda from Gothland, p. 5.*

Placentura Jones and Holl, 1886; Annals Mag. Nat. Hist., London, 5th series, vol. 17, p. 407.

Kyamodes Jones, 1888; Annals Mag. Nat. Hist., London, 6th series, vol. 2, p. 295.

Cyprosis Jones, 1881; Geol. Mag., decade 2, vol. 8, p. 338.

Cyprosina Jones, 1881; Geol. Mag., decade 2, vol. 8, p. 338.

Octonaria Jones, 1887; Annals Mag. Nat. Hist., London, 5th series, vol. 19, p. 404.

CYPRIDÆ.

Aglaia Brady, 1867; Challenger Exped., Rept. on Ostracoda, p. 33.

Candona Baird, 1850; History Brit. Entomostraca, p. 159.

Argillæcia Sars, 1865; Öfversigt af Norges Marine Ostracoder.

Macrocypsis Brady, 1867; Intellectual Observ., vol. 12, p. 119.

Bathocypsis Brady, 1880; Challenger Exped., Rept. on Ostracoda, p. 45.

Bairdia McCoy, 1844; Synopsis Carboniferous Foss. Ireland, p. 164.

DARWINULIDÆ.

Darwinula (Brady and Robertson) Jones, 1885; Quart. Jour. Geol. Soc., vol. 41, p. 346. Name changed from preoccupied term Darwinella (Ann. Mag. Nat. Hist., 4th series, vol. 9, 1872, p. 50).

CYTHERIDÆ.

Cythere Müller, 1785; Entomostraca, etc., p. 64.

Xestoleberis Sars, 1865; Öfversigt af Norges Marine Ostracoder, p. 68.

Bythocythere Sars, 1865; Öfversigt af Norges Marine Ostracoder.

Carbonia Jones, 1870; Geol. Mag., vol. 7, p. 218.

Youngia Jones and Kirkby, 1886; Quart. Jour. Geol. Soc. London, vol. 42, p. 507.

Thlipeura Jones and Holl, 1869; Annals Mag. Nat. Hist., London, 4th series, vol. 3, p. 213.

Bursulella Jones, 1887; Notes on some Sil. Ostracoda from Gothland, p. 7.

Aristozoe Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 474.

Orozoe Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 537.

Callizoe Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 503.

Zonozoe Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 554.

Hippa Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 516.

Bolbozoe Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 500.

Elpe Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 510.

Nothozoe Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 536.

Caryon Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 505.

Cryptozoe Packard, 1888; Proc. Acad. Nat. Sci. Phila., 1888, p. 381.

Cytheropsis (McCoy) Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 508.

CIRRIPEDÆ.

Plumulites Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 565.

Strobilepis Clarke, 1888; Palæont. New York, vol. 7, p. 212.

Palæocreusia Clarke, 1888; Palæont. New York, vol. 7, p. 210.

Protobalanus Whitfield, 1888; Palæont. New York, vol. 7, p. lxii; Bull. Am. Mus. Nat. Hist., vol. 2, 1889, p. 66.

Turrilepas Woodward, 1865; Quart. Jour. Geol. Soc. London, vol. 21, p. 489.

DECAPODA.

Anthrapalæmon Salter, 1861; Quart. Jour. Geol. Soc. London, vol. 17, p. 529.

Palæopalæmon Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 40.

Crangopsis Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 80.

Pseudo-Galathea Peach, 1882; Trans. Royal Soc. Edinb., vol. 30, p. 573.

SCHIZOPODA.

GAMPSONYX Meyer, 1847; Verhandl. Nat. Vereins Preuss., vol. 4, p. 86.
PALÆOCARIS Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., p. 48.
NECTOTELSON Brocchi, 1880; Bull. Soc. Géol. France, 3d series, vol. 8, p. 10.

AMPHIPODA.

DIPLOSTYLUS Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 76.

STROMAPODA.

AMPHIPELTIS Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 75.

CATALOGUE OF NORTH AMERICAN PALEOZOIC CRUSTACEA—NON-TRILOBITA.

(Current generic names in bold face; synonyms in *Italic*.)

Acanthotelson Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 46; Geol. Survey Illinois, vol. 2, 1866, p. 299.

Type, *A. stimsoni*.

—— **eveni** Meek and Worthen, 1868; Am. Jour. Sci., 2d series, vol. 46, p. 28. Coal Measures.

—— **eveni** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 551, figs. a–d.

—— **eveni** White, 1884; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 177, pl. 38, figs. 4–7.

—— **eveni** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 125.

—— *inequalis*. (See **Palæocaris typus**.)

—— ? **magister** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 127, pl. 1, fig. 2; pl. 2, figs. 4, 5. Carboniferous.

—— **stimpsoni** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 47. Coal Measures.

—— **stimpsoni** Meek and Worthen, 1866; Geol. Survey Illinois, vol. 2, p. 401, pl. 32, figs. 6, 6 a–f.

—— **stimpsoni** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 549, figs. a, b.

—— **stimpsoni** Woodward, 1881; Geol. Mag., decade 2, vol. 8, p. 533, pl. 14, fig. 4.

—— **stimpsoni** White, 1884; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 176, pl. 37, figs. 4, 5.

—— **stimpsoni** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 124.

Packard considers this species to be the young of *Acanthotelson eveni*.

Æchmina Jones and Holl, 1887; Annals Mag. Nat. Hist., 5th series, vol. 3, p. 217.

—— **byrnesi** (Miller) Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 12, pl. 3, figs. 9–11. Cincinnati.

For other references, see *Leperditia byrnesi* Miller.

—— **spinosa** (Hall) Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 11, pl. 3, figs. 4–8. Niagara.

For other references, see *Cytherina spinosa* Hall.

Amphipeltis Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 75.

—— **paradoxus** Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 76, figs. 11 a, b. Devonian.

—— **paradoxus** Dawson, 1868; Acadian Geology, p. 523, fig. 180.

—— **paradoxus** Salter and Woodward; Chart of Fossil Crustacea, pl. 3, fig. 3.

Anthraconetes Meek and Worthen, 1868; Am. Jour. Sci., 2d series, vol. 46, p. 21.

—— *mazonensis* Meek and Worthen. (See **Eurypterus mazonensis**.)

Anthrapalæmon Salter, 1861; Quart. Jour. Geol. Soc. London, vol. 17, p. 529.

Type, *A. grossarti* Salter.

—— **gracilis** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 50. Coal Measures.

—— **gracilis**. *Meek and* Worthen, 1866; Geol. Survey Illinois, vol. 2, p. 407, pl. 32, *figs. 4 a, b, c*.

Anthrapalæmon gracilis Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 554, figs. a, b.

—— **gracilis** White, 1884; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 180, pl. 38, figs. 8, 9.

—— **gracilis** Packard, 1885; American Naturalist, vol. 19, p. 880.

—— **gracilis** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 135, pl. 4, figs. 1, 2, 3, 5, 6; pl. 7, figs. 3–6.

—— [*Palæocarabus*] **hillianus** Dawson, 1878; Geol. Mag., vol. 4, p. 56, fig. 1. Coal Measures.

—— [*Palæocarabus*] **hillianus** Dawson, 1878; Suppl. Acadian Geology, p. 55, fig. 10.

Aparchites Jones, 1889; Annals Mag. Nat. Hist., 6th series, vol. 3, p. 385.

—— **minutissimus** (Hall) Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 49.
For other references, see *Leperditia* [*Isochilina*] *minutissima* Hall. Hudson.

—— **unicornis** Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 50, pl. 9, fig. 11.
For other references, see *Leperditia unicornis*. Hudson.

Aptychopsis Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 436.

Archæocaris Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335.

—— **vermiformis** Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335. Carboniferous.

Aristozoe Barrande, 1872; Syst. Sil. Bohême, suppl., vol. 1, p. 474.

—— **rotundata** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 193, pl. 1, fig. 9. Cambrian.

—— **troyensis** (Ford) Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 193, pl. fig. 8. Cambrian.

—— [*Leperditia*] **troyensis** Ford, 1873; Am. Jour. Sci., 3d series, vol. 6, p. 138.

Aristozoe sp. Shaler and Foerste, 1888; Bull. Mus. Comp. Zoology, vol. 16, p. 35, pl. 2, fig. 18. Cambrian.

Belinurus Koenig, 1820; Icones. Foss. Sectiles, p. 18, fig. 230; Baily, Annals Mag. Nat. Hist., London, 3d series, vol. 11, 1863.

—— *danæ* Meek and Worthen. (See **Prestwichia danæ**.)

—— **lacoei** Packard, 1885; American Naturalist, vol. 19, p. 292. Carboniferous.

—— **lacoei** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 149, pl. 5, fig. 5.

Beyrichia McCoy, 1846; Silurian Foss. Ireland, p. 58.
Type, *Beyrichia klodeni* McCoy.

—— **æquilatera** Hall, 1860; Canadian Naturalist, vol. 5, p. 158, fig. 20. Silurian.

—— **æquilatera** Dawson, 1868; Acadian Geology, p. 609, fig. 217.

—— **æquilatera** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 18, pl. 2, fig. 6.

—— **atlantica** Billings, 1865; Pal. Foss., vol. 1, p. 300. Quebec.

—— **bela** Walcott, 1883; Description New Species Trenton Group, p. 7, pl. 17, figs. 11, 11 a. Trenton.

—— **bela** Walcott, 1884; 35th Rept. New York State Mus. Nat. Hist., p. 213, pl. 17, figs. 11, 11 a.

—— **buchiana**? Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 16, pl. 3, fig. 25. Cincinnati.

—— **chambersi** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 234, fig. 27. Hudson.

—— **chambersi** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 104, pl. 4, figs. 11, 12.

—— **ciliata** Emmons, 1855; American Geology, pt. 2, p. 219, fig. 74 c. Hudson.

—— **ciliata** Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 351.

—— **ciliata** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 19, pl. 3, figs. 12–16; pl. 4, figs. 16–18.
Syn., *Beyrichia tumifrons* Hall.

—— ***cincinnatiensis*** Miller, 1875; Cincinnnati Quart. Jour. Sci., vol. 2, p. 350, fig. 25. Hudson.

Beyrichia cincinnatiensis Walcott, 1876; Trans. Albany Inst., vol. 10, p. 23.

—— **clarkei** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 17, wood-cut, fig. 2. Lower Helderberg.

—— **clathrata** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 242, pl. 9, fig. 1. Niagara.

—— **dagon** Clarke, 1885; Bull. U. S. Geol. Survey, No. 16, p. 29, pl. 2, figs. 6, 7. Genesee.

—— **decora** Billings, 1866; Catalogue Sil. Foss. Anticosti, p. 67.

—— **duryi** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 232, figs. 24, 25. Hudson.

—— **fœtoidea** White and St. John, 1868; Trans. Chicago Acad. Sci., vol. 1, p. 126, figs. 11 a, b. Niagara.

—— **granulosa** Hall, 1876; 28th Rept. New York State Mus. Nat. Hist., Doc. Ed. Expl., pl. 32, fig. 4. Niagara.

—— **granulosa** Hall, 1876; 28th Rept. New York State Mus. Nat. Hist., p. 186, pl. 32, fig. 4.

—— **granulosa** Hall, 1883; 11th Annual Rept. Dept. Geol. Nat. Hist. Indiana, p. 331, pl. 34, fig. 4.

—— **granulosa** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 15, pl. 1, fig. 3.

—— **granulata** Hall, 1859; Pal. New York, vol. 3, p. 377, pl. 79 b, figs. 1 a–d. Lower Helderberg.

—— **halli** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 15, pl. 4, fig. 21. Waterlime.

—— **hamiltonensis** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 19, pl. 2, fig. 3. Hamilton.

—— **jonesii** Dawson, 1868; Acadian Geology, p. 313, fig. 132. Carboniferous.

—— ***lata.*** (See **Bollia lata** Vanuxem.)

—— ***lithofactor*** White and St. John, Prelim. Notice New Genera and Species Foss., May 8, 1867, p. 2.
Changed to **Beyrichia petrifactor,** which see. Coal Measures.

—— ***lithofactor*** var. ***velata; idem.***, p. 2. (See **Beyrichia petrifactor** var. **velata.**)

—— **logani** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 244, pl. 9, figs. 6–10. Chazy.

—— **logani** Jones, 1858; Geol. Survey Canada, decade 3, p. 91, pl. 11, figs. 1–5.

—— **logani** var. **remiformis** Jones, 1858; Geol. Survey Canada, decade 3, p. 91, pl. 11, fig. 1.

—— **logani** var. **leperditoides** Jones, 1858; Geol. Survey Canada, decade 3, p. 91, pl. 11, fig. 5.

—— **maccoyana** Jones, 1855; Annals Mag. Nat. Hist., London, 2d series, vol. 16, p. 88, pl. 5, fig. 14. Onondaga.

—— **maccoyana** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 252, pl. 10, fig. 15.

—— **maccoyana** Jones, 1858; Geol. Survey Penn., vol. 2, p. 834, fig. 695.

—— ***notata.*** (See **Klœdenia notata** (Hall) Jones.)

—— **nova scotica** Jones and Kirkby, 1884; Geol. Mag., 5th series, vol. 1, p. 337, pl. 12, figs. 5, 6. Carboniferous.

—— **sp?** Dawson, 1868; Acadian Geology, p. 256, fig. 78 c.

—— [***Primitia***] **occidentalis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 104, pl. 17, figs. 4, 4 a. Devonian.

—— **oculifera** Hall, 1871; Pamphlet Cincinnati Group, p. 8. Hudson.

—— **oculifera** Hall, 1872; 24th Rept. New York State Mus. Nat. Hist., p. 232, pl. 8, figs. 9, 10.

—— **oculifera** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 103, pl. 4, figs. 9, 10.

—— **oculifera** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 118.

oculifera *Jones, 1890;* Quart. Jour. Geol. Soc., vol. 46, p. 21, pl. 4, figs. 19 a, b, 20.

Beyrichia oculina Hall, 1859; Pal. New York, vol. 3, p. 378, pl. 79 b, figs. 2 a–e. Lower Helderberg.

—— **oculina** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 16, pl. 1, fig. 4.

—— **parasitica** (Hall) Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 16, wood-cut. For other references, see *Leperditia parasitica*.

—— **pennsylvanica** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 253, pl. 10, fig. 16–18. Onondaga.

—— **pennsylvanica** Jones, 1858; Geol. Survey Penn., vol. 2, p. 831, fig. 696.

—— **persulcata** Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 12, pl. 7, fig. 6. Hudson.

—— **petrifactor** White and St. John; Trans. Chicago Acad. Sci., vol. 1, p. 125.

—— **petrifactor** var. **velata**; *idem.*, p. 126.

—— **plagosa** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 243, pl. 9, fig. 2. Niagara.

—— **punctulifera** Hall, 1861; Des. New Species Fossils, p. 83. Hamilton.

—— **punctulifera** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 111.

—— **pustulosa** Hall, 1860; Canadian Naturalist, vol. 5, p. 157, fig. 19. Silurian.

—— **pustulosa** Dawson, 1868; Acadian Geology, p. 608, fig. 216.

—— **pustulosa** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 18, pl. 2, fig. 1 a–c. Referred to *Beyrichia tuberculata* Boll var. *pustulosa* Hall.

—— *quadrilirata* Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 105, pl. 4, figs. 6, 7. Hudson.

—— *quadrilirata* Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 351. (See **Strepula quadrilirata.**)

—— **regularis** Emmons, 1855; American Geology, pt. 2, p. 219, fig. 74 b. Hudson.

—— **regularis** Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 351.

This species is placed as a synonym to *Bollia lata* by Jones (1890, Quart. Jour. Geol. Soc., vol. 46, p. 13).

—— **remiformis** Jones, 1858; Geol. Survey Canada, decade 3, p. 91, pl. 11, fig. 1. Chazy.

—— **richardsoni** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 347, fig. 40. Hudson.

—— **rugulifera** Jones, 1858; Annals Mag. Nat. Hist. London, 3d series, vol. 1, p. 242, pl. 9, fig. 4. Niagara.

—— **sigillata** Jones, 1858; Annals Mag. Nat. Hist., London, vol. 1, p. 242, pl. 9, fig. 5. Niagara.

—— **simplex** (Jones) Emmons, 1855; American Geology, vol. 1, pt. 2, p. 218, fig. 74 a.

—— [*Cytherina*] **spinosa** Hall, 1852; Pal. New York, vol. 2, p. 317, pl. 67, figs. 17–20. (See **Æchmina spinosa.**) Niagara.

—— *striato-marginatus* Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 233, fig. 26.

This species is referred to a new genus. (See **Eurychilinda striatomarginatus.**) Hudson.

—— *symmetrica* Hall, 1852; Pal. New York, vol. 2, p. 317, pl. 67, fig. 16. (See **Bollia symmetrica.**) Niagara.

—— **trisulcata** Hall, 1859; Pal. New York, vol. 3, p. 381, pl. 79, figs. 5 a, b. Lower Helderberg.

—— **trisulcata** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 14, pl. 1, fig. 2.

—— **tumifrons** Hall, 1871; Des. New Species Foss. Hudson River Group, p. 7. Hudson.

—— **tumifrons** Hall, 1872; 24th Rept. New York State Mus. Nat. Hist., p. 231, pl. 8, fig. 11.

—— **tumifrons** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 102, pl. 4, fig. 8.

—— ***tumifrons** Miller,* 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 119.

This species is classed by Jones 1890, Quart. Jour. Geol. Soc., vol. 46, p. 19, *as synonymous to Beyrichia ciliata* Emmons.

Beyrichia venusta Billings, 1866; Catalogue Silurian Fossils Anticosti, p. 68.

Bollia Jones and Holl, 1886; Annals Mag. Nat. Hist., 5th series, London, vol. 17, p. 360.

—— [*Agnostus*] **latus** Vanuxem, 1842; Geol. New York, 3d Geol. Dist., p. 80. Clinton.

—— [*Beyrichia*] **lata** Hall, 1852; Pal. New York, vol. 2, p. 301, pl. A 66, figs. 10 a–c.

—— [*Beyrichia*] **lata** Jones, 1858; Notes on Palæozoic Entomostraca, No. 2, p. 168, pl. 6, fig. 13.

—— **lata** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 12, pl. 3, figs. 1–3.

—— [*Beyrichia*] **symmetrica** Hall, 1852; Pal. New York, vol. 2, p. 317, pl. 67, fig. 16. Niagara.

—— **symmetrica** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 12.

This species is closely allied to *Bollia lata*.

—— **ungula** (Claypole MS.) Jones, 1889; American Geologist, vol. 4, p. 338, pl. fig. 10–13. Marcellus.

Bythocypris Brady, 1880; Challenger Exped., Rep. Ostracoda, p. 45.

—— **cylindrica** (Hall) Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 48, pl. 9, fig. 6. Trenton and Hudson.

For other references, see *Leperditia* [*Isochilina*] *cylindrica* Hall.

—— **favulosa** Jones, 1889; American Geologist, vol. 4, p. 338, pl. figs. 2 a–c. Marcellus.

—— **oviformis** Jones, 1889; American Geologist, vol. 4, p. 340, pl. figs. 3 a–c. Lower Helderberg.

Carbonia Jones and Kirkby, 1879; Annals Mag. Nat. Hist., London, 5th series, vol. 4, p. 28.

—— ? **bairdioides** (?) Jones and Kirkby, 1884; Geol. Mag., 5th series, vol. 1, p. 358, pl. 12, figs. 8 a–d. Carboniferous.

Syn., *Bairdia* sp. ? Dawson, 1868; Acadian Geology, p. 206, figs. 48 a (?).

—— [*Cythere ?* (*Carbonia*)] **bairdiodes** Jones and Kirby, 1879; Annals Mag. Nat. Hist., London, 5th series, vol. 4, p. 38, pl. 3, figs. 24, 25.

—— ? **bairdioides** ? Jones and Kirkby, 1884; Geol. Mag., decade 3, p. 358, pl. 12, figs. 8 a–d.

—— ? **elongata** Jones and Kirkby, 1884; Annals Mag. Nat. Hist., London, 6th series, vol. 1, p. 361, pl. 12, fig. 10. Carboniferous.

—— ? **elongata** Jones and Kirkby, 1884; Geol. Mag., decade 3, p. 361, pl. 12, fig. 10.

—— **fabulina** Jones and Kirkby, 1879; Annals Mag. Nat. Hist., London, 5th series, vol. 4, p. 31, pl. 2, figs. 1–9.

—— **fabulina** var. **humilis** Jones and Kirkby, 1879; Annals Mag. Nat. Hist., London, 5th series, vol. 4, p. 31, pl. 2, figs. 11–14.

—— **fabulina** Jones, 1889; Geol. Mag., decade 3, vol. 6, p. 270, figs. 1–4.

—— [*Cytherilla*] *inflata* Dawson, 1868; Acadian Geology, p. 206, fig. 48 b.

—— **fabulina** Jones and Kirkby, 1884; Geol. Mag., decade 3, vol. 1, p. 358, pl. 12, figs. 9 a–e.

Ceratiocaris McCoy, 1849; Annals Mag. Nat. Hist., London, vol. 4, p. 412.

—— **aculeatus** Hall, 1859; Pal. New York, vol. 3, p. 422*, pl. 80 a, fig. 10. Waterlime.

—— **acuminatus** Hall, 1859; Pal. New York, vol. 3, p. 422*, pl. 84, fig. 6. Waterlime.

—— **acuminatus** Pohlman, 1886; Bull. Buffalo Soc. Nat. Sci., vol. 5, p. 28, pl. 3, fig. 2.

—— *armatus* Hall. (See **Echinocaris punctata.**)

—— **beecheri** Clarke, 1881; Bull. U. S. Geol. Survey, No. 16, p. 44, pl. 2, fig. 1. Devonian.

—— **beecheri** Hall, 1888; Pal. New York, vol. 7, p. 104, pl. 31, fig. 3.

—— [*Colpocaris*] **bradleyi** Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 332. Lower Carboniferous.

—— [*Onchus*] **deweyi** Hall, 1852; Pal. New York, vol. 2, p. 320, pl. 71, figs. 1 a–d. Niagara.

Ceratiocaris [*Colpocaris*] **etytroides** Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 334. **Lower Carboniferous.**

—— **grandis** Pohlman, 1881; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 19, fig. 5. **Waterlime.**

—— **longicaudus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 70, pl. 1, fig. 7 (*not* figs. 4, 5, 6). **Hamilton.**

—— **longicaudus** Packard, 1883; 12th Annual Rept. U. S. Geol. Survey Territories, p. 450.

—— **longicaudus** Jones and Woodward, 1884; Geol. Mag., decade 3, vol. 1, p. 1.

—— **longicaudus** Etheridge, Woodward, and Jones; 3d Rept. Comm. Foss. Phyllopoda, p. 35.

—— **longicaudus** Hall, 1888; Pal. New York, vol. 7, p. 163, pl. 31, fig. 1.

Not *C. longicaudus* Clarke, 1885; Bull. U. S. Geol. Survey, No. 16, p. 20.

—— **maccoyana** Hall, 1859; Pal. New York, vol. 3, p. 421, pl. 84, figs. 1–5. **Waterlime.**

—— *? punctatus* Hall. (See **Echinocaris punctata.**)

—— **simplex** Clarke, 1885; Bull. U. S. Geol. Survey, No. 16, p. 43, pl. 2, fig. 2. **Devonian.**

—— ? **simplex** Hall, 1888; Pal. New York, vol. 7, p. 165, pl. 31, fig. 2.

—— ? **sinuata** Meek and Worthen, 1868; Am. Jour. Sci., 2d series, vol. 46, p. 22. **Coal Measures.**

—— ? **sinuata** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 540, fig. a.

—— [*Solenocaris*] **strigata,** Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335. **Lower Carboniferous.**

—— [*Solenocaris*] **strigata** Meek, 1875; Pal. Ohio, vol. 2, p. 321, pl. 18, figs. 4 a–c.

The generic name of *Solenocaris* was used by Mr. J. Young for a genus of the Paleozoic Crustacea in 1868. See **Strigocaris.**

Crangopsis Salter, 1863; Name changed from *Palæocrangon.*

Cryptozoe Packard, 1886; Proc. Am. Philos. Soc., vol. 23, p. 381.

—— **problematicus** Packard, 1886; Proc. Am. Philos. Soc., vol. 23, p. 382, fig. 3, plate. **Carboniferous.**

Cyclus De Koninck, 1841; Mém. Acad. Sci. Bruxelles, vol. 14, p. 18.

—— **americana** Packard, 1885; American Naturalist, vol. 19, p. 293. **Coal Measures.**

—— **americana** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 143, pl. 5, figs. 1, 1 a; pl. 6, figs. 4, 4 a.

Cythere Müller, 1785; Entomostraca, p. 64.

—— [*Beyrichia*] **americana** Shumard, 1858; Trans. Acad. Sci. St. Louis, vol. 1, p. 227. **Upper Coal Measures.**

—— *carbonaria* Hall. (See **Leperditia carbonaria.**)

—— *cincinnatiensis* Meek. (See **Entomis cincinnatiensis.**)

—— **crassimarginata** Winchell, 1862; Proc. Acad. Nat. Sci. Phila., p. 429. **Marshall.**

—— **irregularis** Miller, 1878; Jour. Cincinnati Soc. Nat. Hist., vol. 1, p. 106, pl. 3, figs. 7, 7 a. **Hudson.**

—— **nebrascensis** Geinitz, 1866; Carb. und Dyas in Nebraska, p. 2, pl. 1, fig. 2. **Coal Measures.**

—— **nebrascensis** Meek, 1872; Rept. U. S. Geol. Survey Territories, Final Report Nebraska, p. 237, pl. 11, figs. 1, 2, 3 a, b (?).

—— **nebrascensis** Keyes, 1888; Proc. Acad. Nat. Sci. Phila., p. 222.

—— **ohiones** Herrick, 1889; Bull. Den. Univ., vol. 4, p. 60, pl. 8, fig. 8; vol. 3, pl. 3, fig. 19. **Kinderhook,**

—— **ohiones** Herrick, 1890; American Geologist, vol. 4, p. 254.

—— *okeni.* (See **Leperditia okeni.**)

—— **simplex** White and St. John, 1867; Prelim. Notice New Species Foss., p. 3. **St. Louis.**

—— **simplex** White and St. John, 1868; Trans. Chicago Acad. Sci., vol. 1, p. 127.

Cythere sp.? Dawson, 1868; Acadian Geology, p. 256, fig. 78 a. Carboniferous.

—— *sublævis*. (See **Leperditia sublævis**.)

—— *subrecta*. (See **Leperditia subrecta**.)

Cytherina Lamarck, 1818; Animaux sans Vert., vol. 5, p. 125.

—— *alta*. (See **Leperditia alta**.)

—— **crenulata** Emmons, 1855; Am. Geology, vol. 1, p. 221, figs. 75 a–d. Trenton.

—— *cylindrica*. (See **Isochilina cylindrica**.)

—— **emmonsi** Vogdes, 1889; Annals N. Y. Acad. Sci., vol. 5, p. 13, to replace *C. subcylindrica*.

—— *spinosa*. (See **Beyrichia spinosa**.)

—— *subcylindrica* Emmons, 1855; Am. Geology, vol. 1, p. 220, fig. 75 b. Trenton.
This name was used by Münster for a species of this genus. Change to *C. emmonsi*.

—— **subelliptica** Emmons, 1855; Am. Geology, vol. 1, p. 220, figs. 75 a. Trenton.

Cytherellina Jones and Holl, 1869; Annals Mag. Nat. Hist., London, 4th series, vol. 3, p. 215.

—— **grandella** Whitfield, 1882; Bull. Am. Mus. Nat. Hist. New York, vol. 1, p. 94, pl. 9, figs. 28, 29. Warsaw.

Cytheropsis McCoy, 1855; Synopsis Classification Brit. Pal. Rocks, pl. 1 L., fig. 2.
No definite descriptign of the genus given.

—— *concinna* Jones. (See **Primitia concinna**.)

—— *rugosa* Jones. (See **Primitia rugosa**.)

—— **silique** Jones, 1858; Annals Mag. Nat. Hist., 3d series, London, vol. 1, p. 249, pl. 10, fig. 6. Trenton.

—— **silique** Jones, 1858; Geol. Survey Canada, decade 3, p. 99.

—— **silique** Jones, 1869; Annals Mag. Nat. Hist., London, 4th series, vol. 3, p. 216, pl. 14, figs. 1–6.

Dipeltis Packard, 1885; Am. Naturalist, vol. 19, p. 293.

—— **diplodiscus** Packard, 1885; Am. Naturalist, vol. 19, p. 293. Carboniferous.

—— **diplodiscus** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 145, pl. 5, figs. 2, 2 a.

Diplostylus Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 76.

—— **dawsoni** Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 77, fig. 6. Coal Measures.

Dipterocaris Clarke, 1883; Am. Jour. Sci., 3d series, vol. 25, p. 121.

—— **pennæ-dædali** Clarke, 1883; Am. Jour. Sci., 3d series, vol. 25, p. 122, fig. 1. Chemung.

—— **pennæ-dædali** Jones and Woodward, 1884; Geol. Mag., decade 3, vol. 1, p. 349.

—— **pennæ-dædali** Etheridge, Woodward, and Jones, 1884; 2d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 11.

—— **pennæ-dædali** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 3.

—— **pennæ-dædali** Hall, 1888; Pal. New York, vol. 7, p. 200, pl. 35, fig. 24.

—— **pennæ-dædali** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 9.

—— **percervæ** Clarke, 1883; Am. Jour. Sci., 3d series, vol. 25, p. 123, figs. 4, 5. Chemung.

—— **percervæ** Jones and Woodward, 1884; Geol. Mag., decade 3, vol. 1, p. 349.

—— **percervæ** Etheridge, Woodward, and Jones, 1884; 2d Rept. Comm. Foss. Phyllolopoda Pal. Rocks, p. 11.

—— **percervæ** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 3.

—— **percervæ** Hall, 1888; Pal. New York, vol. 7, p. 202, pl. 35, figs. 20, 21.

—— **percervæ** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 9.

Dipterocaris prœne Clarke, 1883; Am. Jour. Sci., 3d series, vol. 25, p. 122, figs. 2, 3. Chemung.

—— **prœne** Jones and Woodward, 1884; Geol. Mag., decade 3, vol. 1, p. 349.

—— **prœne** Etheridge, Woodward, and Jones, 1884; 2d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 11.

—— **prœne** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 3.

—— **prœne** Hall, 1888; Pal. New York, vol. 7, p. 201, pl. 35, figs. 25–27.

—— **prœne** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 9.

Dithyrocaris (Scouler, 1843, MS.) Portlock, 1843; Rept. Geol. Londonderry, etc., p. 313.

—— **belli** Woodward, 1870; Geol. Mag., decade 2, vol. 8, p. 106, pl. 3, figures. Devonian.

—— **belli** Etheridge, Woodward, and Jones, 1887; 5th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 6.

—— **belli** Hall, 1888; Pal. New York, vol. 7, p. 194.

—— **carbonaria** Meek and Worthen, 1870; Proc. Acad. Nat. Sci. Phila., vol. 22, p. 55. Coal Measures.

—— **carbonaria** Meek and Worthen, 1873; Geol. Survey Illinois, vol. 5, p. 6'8, pl. 32, fig. 1.

—— **carbonaria** White, 1884; 13th Rept. Dept. Geol. Nat. Hist. Indiana, p. 178, pl. 39, fig. 2.

—— *neptuni* Hall. (See **Mesothyra neptuni.**)

Dolichocephala Claypole, 1883; Proc. Am. Philos. Soc., vol. 21, p. 236.

—— *locoana idem;* p. 236, plate. (See **Stylonurus excelsior.**)

Dolichopterus (subgenus **Eurypterus**) Hall, 1859; Pal. New York, vol. 3, p. 414.*

—— **macrocheous** Hall, 1859; Pal. New York, vol. 3, p. 414,* pl. 83, fig. 1; pl. 83 a, fig. 1. Waterlime.

Echinocaris Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 34.

—— **condylepsis** Hall, 1888; Pal. New York, vol. 7, p. 173, pl. 19, figs. 14–17. Chemung.

—— **multinodosa** Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 38, fig. 8. (Plates with author's special edition only.) Erie Shales.

—— **multinodosa** Packard, 1882; Am. Naturalist, vol. 16, p. 952, fig. 10.

—— **multinodosa** Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 451, fig. 71 a.

—— **multinodosa** Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 5.

—— **multinodosa** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.

—— **multinodosa** Hall, 1888; Pal. New York, vol. 7, p. 180, pl. 29, figs. 18–19.

—— **multinodosa** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

—— [*Ceratiocaris*] **punctatus** Hall, 1863; 16th Rept. New York State Cab. Nat. Hist. p. 74, pl. 1, fig. 8. Hamilton.

—— **punctatus** Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 39.

Syn., *Ceratiocaris armatus* Hall, 1863; 16th Rept. New York State Cab. Nat. Hist., p. 72, pl. 1, figs. 1–3.

Ceratiocaris armatus Hall, 1876; Illus. Devonian Foss., pl. 23, figs. 4, 5.

—— [*Ceratiocaris* (*Aristozoe*)] **punctatus** Hall, 1876; Illus. Devonian Foss., Expl. pl. 23, fig. 7.

—— **punctatus** Packard, 1882; Am. Naturalist, vol. 16, p. 952, fig. 12.

—— **punctatus** Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 450, fig. 70.

Syn., armatus Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 451.

Echinocaris punctatus Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 6, pl. 1, figs. 13–16; also fig. 1 in text, page 4.

Syn., *armatus* Jones and Woodward, 1884; Geol. Mag., decade 3, vol. 1, p. 2, pl. 13, fig. 2.

armatus Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.

—— **punctatus** Hall, 1888; Pal. New York, vol. 7, p. 166, pl. 27, fig. 10; pl. 28, fig. 1–7; pl. 29, fig. 1–8.

—— **punctatus** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

—— **pustulosa** Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 38, pl. fig. 7 (plate with author's special edition only). Erie Shales.

—— **pustulosa** Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 451.

—— **pustulosa** Beecher, 1884; 2d Geol. Survey Penn., vol. PPP., p. 5.

—— **pustulosa** Jones and Woodward, 1884; Geol. Mag., decade 3, vol. 1, p. 2, pl. 13, fig. 6.

—— **pustulosa** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss-Phyllopoda Pal. Rocks, p. 35.

—— **pustulosa** Hall, 1888; Pal. New York, vol. 7, p. 178, pl. 29, figs. 9, 10.

—— **pustulosa** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

—— **socialis** Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 10, pl. 1, figs. 1–1*e*. Chemung.

—— **socialis** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.

—— **socialis** Hall, 1888; Pal. New York, vol. 7, p. 174, pl. 30, figs. 1–12.

—— **socialis** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

—— **sublevis** Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 36, pl. figs. 4–6 (plate with the author's special edition only). Erie Shales.

—— **sublevis** Packard, 1882; Am. Naturalist, vol. 16, p. 952, fig. 11.

—— **sublævis** Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 450, fig. 71 b.

—— **sublevis** Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 5.

—— **sublævis** Jones and Woodward, 1884; Geol. Mag., decade 3, vol. 1. p. 2, pl. 13, figs. 3, 4, 5.

—— **sublævis** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.

—— **sublævis** Hall, 1888; Pal. New York, vol. 7, p. 176, pl. 29, figs. 11–13.

—— **sublævis** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

—— **whitfieldi** Clarke, 1885; Bull. U. S. Geol. Survey, No. 16, p. 45, pl. 2, figs. 3, 4. Portage.

—— **whitfieldi** Hall, 1888; Pal. New York, vol. 7, p. 172, pl. 29, figs. 20, 21.

—— **whitfieldi** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

Echinognathus Walcott, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 213.

—— **clevelandi** Walcott, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 213, figs. 1, 2. Utica.

—— [*Eurypterus ?*] **clevelandi** Walcott, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 151.

Elymocaris Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 13.

—— **siliqua** Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 13, pl. 2, figs. 1, 2. Chemung.

—— **siliqua** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.

Elymocaris siliqua Hall, 1888; Pal. New York, vol. 7, p. 182, pl. 31, figs. 5, 6.

—— **siliqua** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

Entomis Jones, 1861; Mem. Geol. Survey Scotland, Expl. Map 32, p. 137; also, Annals Mag. Nat. Hist., London, 4th series, vol. 11, p. 413.

—— [*Cythere*] **cincinnatiensis** Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 331. **Hudson.**

—— [*Cythere*] **cincinnatiensis** Meek, 1873; Pal. Ohio, vol. 1, p. 158, pl. 14, figs. 1 a–1 d.

—— [*Cythere*] **cincinnatiensis** Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 120.

—— **cincinnatiensis** Jones, 1884; Annals. Mag. Nat. Hist., London, 5th series, vol. 14, note p. 395.

—— **rhomboidea** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 10, pl. 2, figs. 9, 10 a, b. **Hamilton.**

Equisetides wrightiana. This species is referred by Woodward and Jones (3d Report Comm. Foss. Phyllopoda Brit. Assoc., 1885, p. 360) to *Echinocaris.* Prof. James Hall places it provisionally with *Stylonurus,* which see.

Estheria Ruffell, 1857; Mus. Senckenberg, vol. 2, p. 119.

—— **dawsoni** Jones, 1870; Geol. Mag., vol. 7, p. 220, pl. 9, fig. 15. **Carboniferous.**

—— **dawsoni** Jones, 1878; Geol. Mag., decade 2, vol. 2, p. 101, pl. 3, fig. 2.

—— sp.? Dawson, 1868; Acadian Geology, p. 256, fig. 78 d.

—— **dawsoni** Jones and Kirkby, 1884; Geol. Mag., decade. 3, vol. 1, p. 361, pl. 12, fig. 12.

—— **pulex** Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 476, pl., fig. 4. **Hamilton.**

—— **pulex** Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 355.

—— **pulex** Etheridge, Woodward, and Jones, 1885; 5th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 10.

—— **pulex** Hall, 1888; Pal. New York, vol. 7, p. 206, pl. 35, figs. 10, 11.

—— **pulex** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 9.

Euproops Meek, 1867; Am. Jour. Sci., 2d series, vol. 34, p. 394. (See **Bellinurus** and **Prestwichia.**)

Eurychilinda Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 52.

—— **mantiobensis** Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 53, pl. 9, figs. 10, 10 a. **Hudson.**

—— **reticulata** Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 52, pl. 9, figs. 9, 9 a. **Trenton.**

—— **striato-marginata** (Miller) Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 52.

For other references, see **Beyrichia striato-marginata.**

Eurypterus De Kay, 1825; Annals Lyceum Nat. Hist. N. Y., vol. 1, pt. 2, p. 375.

—— **beecheri** Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 30, pl. 3, fig. 1. **Chemung.**

—— **beecheri** Hall, 1888; Pal. New York, vol. 7, p. 156, pl. 27, fig. 5.

—— **beecheri** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 9.

—— **boylei** Whiteaves, 1884; Pal. Fossils, vol. 3, pt. 1, p. 42, pl. 7, fig. 3. **Guelph.**

—— **dekayi** Hall, 1859; Pal. New York, vol. 3, p. 41f*, pl. 82, fig. 1. **Waterlime.**

—— **eriensis** Whitfield, 1881; Annals New York Acad. Sci., vol. 2, p. 196. **Lower Helderberg.**

—— **giganteus** Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 41, pl. 2, fig. 1. **Waterlime.**

—— **lacustris** Harlan, 1834; Trans. Geol. Soc. Pennsylvania, vol. 1, p. 98, pl. 5, fig. 2. **Waterlime.**

Eurypterus lacustris Harlan, 1835; Med. Phys. Researches, p. 297, plate, fig. 2.

—— **lacustris** Hall, 1859; Pal. New York, vol. 3, p. 407*, pl. 81, figs. 1-11; pl. 81 a, fig. 1; pl. 81 b, figs. 1-5; pl. 83 b, fig. 3; also fig. 5 in text p. 400*.

—— **lacustris var. robustus** Hall, 1859; Pal. New York, vol. 3, p. 410*, pl. 81 c, fig. 2.

—— [*Dolichopterus*] **mansfieldi** Hall, C. E., 1877; Proc. Am. Philos. Soc., vol. 16, p. 621. Carboniferous.

—— **mansfieldi** Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 32, pl. 4, figs. 1-8; pl. 5, figs. 1-11; pl. 6, fig. 1; pl. 7, fig. 1; pl. 8, figs. 1-3.

—— [*Anthracònectes*] **mazonensis** Meek and Worthen, 1868; Am. Jour. Sci., 2d series, vol. 46, p. 21. Coal Measures.

—— [*Anthraconectes*] **mazonensis** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 544, figures.

—— [*Anthraconectes*] **mazonensis** Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 25, fig. 2; p. 27, fig. 3.

—— [*Anthraconectes*] **mazonensis** White, 1884; 13th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, p. 168, pl. 37, figs. 1, 2, 3.

—— **microphthalmus** Hall, 1859; Pal. New York, vol. 3, p. 407*, pl. 80 a, fig. 7. Lower Helderberg.

—— **pachycheirus** Hall, 1859; Pal. New York, vol. 3, p. 412*, pl. 8, figs. 1-3. Waterlime.

—— **pennsylvanicus** Hall, C. E., 1877; Trans. Am. Philos. Soc. Phila., vol. 7, p. 621. Carboniferous.

—— **pennsylvanicus** Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 31, pl. 5, fig. 18.

—— **pohlmani** Vogdes, 1889; to take the place of the preoccupied name of *E. scorpionis* Grote and Pitt. Ann. N. Y. Acad. Sci., vol. 5, No. 1.

—— **potens** Hall, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, pl. 4, figs. 9, 10. Carboniferous.

—— **prominens** Hall, 1884; Proc. Am. Assoc. Adv. Sci., vol. 33, p. 420. Clinton.

—— **prominens** Hall, 1888; Pal. New York, vol. 7, p. 157, pl. 27, figs. 3, 4.

—— **pulicaris** Salter, 1863; Quart. Jour. Geol. Soc. London, vol. 19, p. 78, figs. 9, 10. Coal Measures.

—— **pulicaris** Dawson, 1868; Acadian Geology, p. 523, figs. 179 a, b.

—— **pustulosus** Hall, 1859; Pal. New York, vol. 3, p. 413*, pl. 83 b, fig. 1. Waterlime.

—— **remipes** De Kay. Waterlime.

Syn., *Fossil Fish* Mitchell, 1818; Am. Monthly Mag., vol. 3, p. 291.

—— **remipes** De Kay, 1825; Annals Lyceum Nat. Hist., vol. 1, p. 375, pl. 29.

—— **remipes** Harlan, 1834; Trans. Geol. Soc. Penn., vol. 1, p. 96, pl. 5.

—— **remipes** Harlan, 1835; Medical Phys. Researches, p. 297, pl., fig. 1.

—— **remipes** Milne-Edwards, 1840; Hist. Nat. Crust., vol. 3, p. 422.

—— **remipes** Burmeister, 1843; Org. Trilobiten, p. 62 (Ray Soc. ed., p. 54).

—— **remipes** Bronn, 1837; Lethea Geognostica, vol. 1, p. 666, pl. 9^3, fig. 1; pl. 9, fig. 1.

—— **remipes** Salter, 1859; Quart. Jour. Geol. Soc. London, vol. 15, p. 255.

—— **remipes** Nieszkowski, 1858; Der *Eurypterus remipes*, etc., pls. 1, 2, 3.

—— **remipes** Hall, 1859; Pal. New York, vol. 3, p. 404, pl. 80, figs. 1-12; pl. 80 a, figs. 1-6; pl. 83 b, fig. 2, also p. 403*, figs. 6, 7.

—— **remipes** (numerous authors).

—— [*Eusarcus*] **grandis** Grote and Pitt, 1875; Bull. Buffalo Soc. Nat. Sci., vol. 3, p. 17. Waterlime.

Referred by J. Pohlman (Bull. Buffalo Soc. Nat. Sci., vol. 5, p. 31) to *Eurypterus scorpionis*. An almost similar term, *E. scorpioides* was used for a species of this genus by H. Woodward in 1868; I suggest that of *E. pohlmani* for this species.

—— [*Eusarcus*] *scorpionis* Grote and Pitt, 1875; Bull. Buffalo Soc. Nat. Sci., vol. 3, *pp. 1, 17, photographic plate.* Waterlime.

Eurypterus [*Eusarcus*] **scorpionis** (Grote and Pitt) Pohlman, 1886; Bull. Buffalo Soc. Nat. Sci., vol. 5, p. 30, pl. 2, fig. 3.

—— [*Eusarcus*] *grandis* (Grote and Pitt) Pohlman, 1886; Bull. Buffalo Soc. Nat. Sci., vol. 5, p. 31.

Referred to *Eurypterus pohlmani* Vogdes, 1889; Annals N. Y. Acad. Sci., vol. 5, p. 22.

Hymenocaris Salter, 1853; 22d Rept. Brit. Assoc. Adv. Sci., Trans. of sec., p. 56.

Isochilina Jones, 1857; Mem. Geol. Survey Canada, decade 3, p. 97.

—— [*Leperditia* (*Isochilina*)] **armata** Walcott, 1883; Des. New Sp. Foss. Trenton Group, p. 7.

—— [*Leperditia* (*Isochilina*)] **armata** Walcott, 1884; 35th Rept. N. Y. State Mus. Nat. Hist., p. 213.

—— **cristata** (Whitfield) Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 23, pl. 1, fig. 8. Calciferous.

For other references, see **Primitia cristata.**

—— [*Cytherina*] **cylindrica** Hall, 1852; Pal. New York, vol. 2, p. 14, pl. 4, figs. 8 a, b. Medina.

Prof. T. Rupert Jones (Quart. Jour. Geol. Soc., vol. 46, 1890, p. 8) refers this species to *Leperditia cylindrica.*

—— [*Leperditia* (*Isochilina*)] **cylindrica** Jones, 1858; Annals Mag. Nat. Hist., 3d series, vol. 1, p. 253; also, Geol. Survey Canada, decade 3, p. 101.

—— [*Leperditia* (*Isochilina*)] **cylindrica** Hall, 1871; Description n. sp. Fossils Hudson River Group.

—— [*Leperditia* (*Isochilina*)] **cylindrica** Hall, 1872; 24th Rept. N. Y. State Mus. Nat. Hist., p. 231, pl. 8, fig. 2; also, Pal. Ohio, vol. 2, 1875, p. 101, pl. 4, fig. 5.

Prof. T. Rupert Jones (Quart. Jour. Geol. Soc., vol. 46, 1890, p. 8) refers this species to *Primitia minuta* Eichwald.

—— **cylindrica** Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 351.

—— **fabacea** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 22, pl. 2, fig. 11. Hamilton.

—— [*Leperditia* (*Isochilina*)] **gracilis** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 248, pl. 10, fig. 2; also, Geol. Survey Canada, decade 3, p. 98, pl. 2, fig. 15. Trenton.

—— **gregaria** (Whitfield) Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 22, pl. 1, figs. 9, 10.

For other references, see **Primitia gregaria.**

—— **jonesi** Wetherby, 1881; Jour. Cincinnati Soc. Nat. Hist., vol. 4, p. 80, pl. 2, figs. 7, 7 a. Subcarboniferous.

—— **lineata** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 21, pl. 2, figs. 5 a, b, 8 a, b. Hamilton.

—— [*Leperditia* (*Isochilina*)] **minutissima** Hall, 1871; Des. New Species Foss. Hudson River Group, p. 7.

—— [*Leperditia* (*Isochilina*)] **minutissima** Hall, 1872; 24th Rept. New York State Mus. Nat. Hist., p. 231, pl. 8, fig. 13.

—— [*Leperditia* (*Isochilina*)] **minutissima** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 102, pl. 4, fig. 5. (See **Aparchites minutissima.**)

—— [*Leperditia* (*Isochilina*)] **ottawa** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 248, pl. 11, fig. 1. Chazy.

—— [*Leperditia* (*Isochilina*)] **ottawa** Jones, 1858; Geol. Survey Canada, decade 3, p. 97, pl. 9, fig. 14.

—— **ottawa** Jones, 1884; Annals Mag. Nat. Hist., London, 5th series, vol. 14, p. 345.

—— **seelyi** (Whitfield) Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 22, pl. 1, fig. 7.

For other references, see **Primitia seelyi.**

Klœdenia Jones and Holl, 1886; Annals Mag. Nat. Hist., London, 5th series, vol. 17, p. 362.

Klœdenia [*Beyrichia*] **notata** Hall, 1859; Pal. New York, vol. 3, p. 379, pl. 79 b, figs. 3 a, b, c. Lower Helderberg.

—— [*Beyrichia*] **notata** var. **ventricosa** Hall, 1859; *idem*, p. 380, pl. 79 b, figs. 4 a, b, c.

—— **notata** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 13, pl. 4, figs. 22, 23.

—— **notata** var. **ventricosa** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 14, pl 1, figs. 1 a, b; pl. 4, fig. 24.

—— **pennsylvanica** Jones, 1889; American Geologist, vol. 4, p. 341, pl., figs. 5–9. Lower Helderberg.

—— **simplex** Jones, 1889; American Geologist, vol. 4, p. 338, pl., fig. 14. Upper Devonian.

Leaia Jones, 1862; Mon. Fossil Estheriæ, p. 115.

—— [*Cypricardia*] **leidyi** Lea, 1855; Proc. Acad. Nat. Sci. Phila., vol. 7, p. 341, pl. 4. Coal Measures.

—— **leidyi** Jones, 1862; Mon. Fossil Estheriæ, p. 116, pl. 5, figs. 11, 12.

—— **leidyi** Dawson, 1868; Acadian Geology, p. 256, fig. 78 c.

—— **leidyi** Packard, 1882; 12th Rept. U. S. Geol. Survey Territories, p. 358, fig. 24.

—— **leidyi** Jones, 1870; Geol. Mag., vol. 7, p. 219, pl. 9, fig. 11; also, Geol. Mag., decade 3, vol. 1, p. 361, pl. 12, fig. 13.

—— **tricarinata** Meek and Worthen, 1868; Geol. Survey Illinois, vol. 3, p. 541, figs. B_1, B_2, B_3. Coal Measures.

—— **tricarinata** White, 1884; 13th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, p. 167, pl. 39, figs. 10–13.

Leperditia Rouault, 1851; Bull. Soc. Géol. France, 2d series, vol. 8, p. 377.

—— [*Cytherina*] **alta** Conrad, 1842; Geol. Rept. New York, 3d Geol. Dist. (Vanuxem), p. 112. Lower Helderberg.

—— [*Cytherina*] **alta** ? Hall, 1852; Pal. New York, vol. 2, p. 338, pl. 78, figs. 2 a–d. Referred to *Leperditia jonesi* Hall, *idem*, vol. 3, p. 372.

—— **alta** Jones, 1856; Annals and Mag. Nat. Hist., London, 2d series, vol. 17, p. 88, pl. 7, figs. 6, 7.

—— **alta** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 250, pl. 10, figs. 10, 11.

—— **alta** Hall, 1859; Pal. New York, vol. 3, p. 373, pl. 79 a, figs. 6 a–e.

—— **alta** Meek, 1873; Pal. Ohio, vol. 1, p. 187, pl. 17, figs. 2 a, b.

—— **alta** Jones, 1881; Annals Mag. Nat. Hist., London, 5th series, vol. 8, p. 346.

—— **alta** Whitfield, 1882; Geol. Wisconsin, vol. 4, p. 323, pl. 25, figs. 8, 9.

—— **alta** Jones, 1884; Annals Mag. Nat. Hist., London, 5th series, vol. 14, p. 343.

—— **alta** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 25, pl. 1, figs. 6 a, b.

—— **amygdalina** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 341. Trenton.

—— **amygdalina** Jones, 1858; Geol. Survey Canada, decade 3, p. 97, pl. 11, figs. 18, 19.

—— **amygdalina** Jones, 1881; Annals Mag. Nat. Hist., London, 5th series, vol. 8, p. 344, pl. 19, fig. 9.

—— **amygdalina** Jones, 1884; Annals Mag. Nat. Hist., London, 5th series, vol. 14, p. 342.

—— **angulifera** Whitfield, 1881; Annals New York Acad. Sci., vol. 2, p. 199. Lower Helderberg.

—— **anna** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 347, pl. 9, fig. 8. Calciferous.

—— **anna** Jones, 1858; Geol. Survey Canada, decade 3, p. 96, pl. 11, fig. 13.

—— **anticostiana** Jones, 1884; Annals Mag. Nat. Hist., London, 3d series, vol. 14, p. 241. Hudson.

Syn., *canadensis* var. *anticostiana* Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 341. Hudson.

canadensis var. *anticostiana* Jones, 1858; Geol. Survey Canada, decade 3, p. 95, pl. 11, fig. 17.

Leperditia anticostiana Billings, 1866; Catalogue Sil. Foss., Anticosti, p. 68.

Syn., *fabulites* (Conrad) var. *anticostiana* Jones, 1881; Annals Mag. Nat. Hist., London, 5th series, vol. 8, p. 344, pl. 19, fig. 8.

—— **arctica** Jones, 1856; Annals Mag. Nat. Hist., London, 2d series, vol. 17, p. 87, figs. 1-5. Upper Silurian.

Syn., *balthica* var. *arctica* (Jones) Salter, 1852; Appendix Sutherland's Jour. Voyage Baffin's Bay, vol. 2, p. ccxxi, pl. 5, fig. 13.

balthica var. *arctica* (Jones) Salter, 1853; Quart. Jour. Geol. Soc. London, vol. 9, p. 314.

—— **argenta** Walcott, 1886; Bull. U. S. Geol. Survey, No. 30, p. 146, pl. 8, fig. 5. Middle Cambrian.

—— **billingsi** Jones, 1856; Annals Mag. Nat. Hist., London, 2d series, vol. 8, p. 345, pl. 15, fig. 9. Trenton.

—— **bivertex** Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 11, pl. 7, figs. 5, 5 a. Hudson.

—— **bivia** White, 1874; Rept. Invert. Foss. U. S. Geog. and Geol. Survey W. 100th Mer., p. 11. Quebec.

—— **bivia** White, 1877; U. S. Geog. and Geol. Survey W. 100th Mer., Palæont., vol. 4, p. 58, pl. 3, figs. 7 a-d.

—— *byrnesi* Miller, 1874; Cincinnati Quart. Jour. Sci., vol. 1, p. 123, fig. 10. (See **Æchmina beyrnesi.**) Hudson.

—— **cæcigena** Miller, 1881; Jour. Cincinnati Soc. Nat. Hist., vol. 1, p. 263, pl. 6, figs. 5, 5 a. Hudson.

—— **canadensis** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 244, pl. 9, figs. 11-15. Chazy and Trenton.

—— **canadensis** Jones, 1858; Geol. Survey Canada, decade 3, p. 92; var. *nana*, pl. 11, figs. 6, 7, 9, 10, and *labrosa*, pl. 11, fig. 8.

—— **canadensis** Jones, 1881; Annals Mag. Nat. Hist., London, 5th series, vol. 14, p. 340.

Compare *Leperditia turgida*, *L. concinnula*, and *L. ventralis*.

—— *canadensis* var. *pauquettiana* Jones. (See **Leperditia louckana.**)

—— [*Cythere*] **carbonaria** Hall, 1858; Trans. Albany Inst., vol. 4, p. 33. Warsaw.

—— **carbonaria** Whitfield, 1882; Bull. Am. Mus. Nat. Hist., New York, vol. 1, p. 94, pl. 9, figs. 24-27.

—— *capax* Safford; Geol. Tennessee. (Not defined.)

—— **cayuga** Hall, 1861; Des. New Species Foss., p. 83. Corniferous.

—— **cayuga** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 111.

—— **claypolei** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 25, pl. 3, figs. 17 a-c. Cincinnati.

—— **concinnula** Billings, 1865; Pal. Fossils, vol. 1, p. 299. Quebec.

—— **crepiformis** Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 10, pl. 7, figs. 3, 3 a. Hudson.

—— [*Cytherina*] **cylindrica** Hall, 1852; Pal. N. Y., vol. 2, p. 14, pl. 4, figs. 8 a, b.

For other references, see **Isochilina cylindrica.** Medina.

—— **dermatoides** Walcott, 1887; Am. Jour. Sci., 3d series, vol. 34, p. 192, pl. 1, figs. 13, 13 a. Cambrian.

—— **faba** Hall, 1876; 28th Rept. New York State Mus. Nat. Hist., Expl., pl. 32, figs. 1-3. Niagara.

—— **faba** Hall, 1879; 28th Rept. New York State Mus. Nat. Hist., p. 186, pl. 32, figs. 1-3 (2d ed.).

—— **faba** Hall, 1882; 11th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, p. 331, pl. 34, figs. 1-3.

—— [*Cytherina*] **fabulites** Conrad, 1843; Proc. Acad. Nat. Sci. Phila., vol. 1, p. 332. Trenton.

—— ***fabulites* *Jones, 1856*;** Annals Mag. Nat. Hist., London, 2d series, vol. 17, p. 89.

Leperditia fabulites Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 341.

—— **fabulites** Jones, 1881; Annals Mag. Nat. Hist., London, 4th series, vol. 8, p. 342.

—— **fabulites** Whitfield, 1883; Geol. Wisconsin, vol. 1, p. 60, fig. 5.

—— **fabulites** Jones, 1884; Annals Mag. Nat. Hist., London, 5th series, vol. 14, p. 342.

—— **fonticola**, 1867; 20th Rept. New York State Cab. Nat. Hist., p. 335, pl. 21, figs. 1-3. Niagara.

—— **fonticola**, 1870; 20th Rept. New York State Cab. Nat. Hist. (rev. ed.), p. 428, pl. 21, figs. 1-3.

—— **gibbera** Jones, 1856; Annals Mag. Nat. Hist., London, 2d series, vol. 17, p. 90, pl. 7, figs. 1-3. Niagara.

—— **gibbera** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 250, pl. 10, figs. 7-9.

—— **gibbera** var. **scalaris** Jones, 1858; Geol. Survey Penn., vol. 2, p. 834, fig. 698.

—— ***gracilis.*** (See **Isochilina gracilis.**)

—— **hudsonica** Hall, 1859; Pal. New York, vol. 3, p. 375, pl. 79 a, figs. 7 a, b, c. Lower Helderberg.

—— **hudsonica** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 24, pl. 1, figs. 5 a-c, 11 a-c; pl. 3, fig. 20 (?)

—— **jonesi** Hall, 1859; Pal. New York, vol. 3, p. 272, pl. 79 a, figs. 5 a-e. Lower Helderberg.

—— **jonesi** Jones, 1884; Annals Mag. Nat. Hist., London, 5th series, vol. 1, p. 343.

Syn., *alta* Hall, 1852; Pal. New York, vol. 2, p. 338, pl. 78, figs. 2 a-d.

—— **josephiana** Jones, 1884; Annals Mag. Nat. Hist, London, 5th series, vol. 1, p. 341. Trenton.

Syn., ***canadensis*** var. *josephiana* Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 341.

- ***canadensis*** var. *josephiana* Jones, 1858; Geol. Survey Canada, decade 3, p. 94, pl. 11, fig. 16.

fabulites var. ***josephiana*** Jones, 1881; Annals Mag. Nat. Hist., London, 5th series, vol. 8, p. 344, pl. 19, fig. 7; pl. 20, figs. 7, 8; also, p. 345, pl. 20, fig. 4 (?).

—— ***labrosa.*** (See **Leperditia canadensis.**)

—— **louckiana** Jones, 1884; Annals Mag. Nat. Hist., London, 5th series, vol. 1, p. 341. Trenton.

Syn., ***canadensis ?*** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 245, pl. 9, figs. 16, 17.

Afterwards var. *louckiana* and *Leperditia canadensis* var. ***pauquettiana.***

canadensis var. *louckiana* Jones, 1858; Geol. Survey Canada, decade 3, p. 93, pl. 11, fig. 11.

fabulites var. ***louckiana*** Jones, 1881; Annals Mag. Nat. Hist., London, 5th series, vol. 8, p. 343.

—— [***Cypridina***] **marginata** Keyserling, 1846; Wiss. Beob. auf einer Reise in das Petochora-Land, p. 288, pl. 11, fig. 16.

—— **marginata** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 17, p. 91, pl. 7, figs. 11, 14, 15.

Syn., ***Cyridina balthica*** Eichwald (not *Cytherina balthica* Hisinger) Bull. Soc. Nat. Moscou, 1854, No. 1, p. 99, pl. 2, fig. 6.

—— [***Isochilina***] ***minutissima*** Hall. (See **Isochilina minutissima.**)

—— ***morgani*** Safford; Geol. Tennessee. (Not defined.)

—— **Nana** ? Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 27, pl. 4, fig. 4. (See, also, **Leperditia canadensis** var. **nana.**)

—— **okeni** (Münster) Dawson, 1868; Acadian Geology, p. 256, fig. 78 b. Lower Carboniferous.

—— ***ottawa.*** (See **Isochilina ottawa.**)

—— **ovata** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 252, pl. *10, fig. 14.* Trenton

Leperditia ovata Jones, 1858; Geol. Survey Penn., vol. 2, p. 834, fig. 697.

—— *pauquettiana*. (See **Leperditia canadensis** var. **pauquettiana.**)

—— *parasitica* Hall, 1859; Pal. New York, vol. 3, p. 376, pl. 79 a, figs. 8 a, b. Lower Helderberg.

Referred by T. R. Jones to **Beyrichia parasitica**, which see.

—— **parvula** Hall, 1859; Pal. New York, vol. 3, p. 376, pl. 79 a, figs. 9 a, b. Lower Helderberg.

—— **pennsylvanica** Jones, 1858; Annals Mag. Nat. Hist., London, 3d series, vol. 1, p. 251, pl. 10, figs. 12, 13. Clinton.

—— **pennsylvanica** Jones, 1858; Geol. Survey Penn., vol. 2, p. 834, fig. 699.

—— *punctulifera* Hall, 1860; 13th Rept. New York State Cab. Nat. Hist., p. 92. (See **Primitiopsis punctulifera.**) Hamilton.

—— **radiata** Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 9, pl. 7, figs. 2 a, b. Utica.

—— **rotundata** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 206, pl. 16, fig. 5. Devonian.

—— **scalaris** (**Leperditia gibbera** var. **scalaris** Jones, 1858); Annals Mag. Nat. Hist. London, 3d series, vol. 1, p. 250, pl. 10, figs. 7–9. Waterlime.

—— **seneca** Hall, 1861; Des. New Species Fossils, p. 84. Hamilton.

—— **seneca** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 112.

—— **seneca** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 23, pl. 1, figs. 13, 14.

—— **sinuata** Hall, 1860; Canadian Naturalist, vol. 5, p. 158. Upper Silurian.

—— **sinuata** Dawson, 1868; Acadian Geology, p. 609, fig. 217.

—— **sinuata** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 24, pl. 1, figs. 12 a–c.

—— **spinulifera** Hall, 1861; Des. New Species Fossils, p. 83. Corniferous.

—— **spinulifera** Hall, 1862; 15th Rept. New York State Cab. Nat. Hist., p. 111.

—— [*Cythere*] **sublævis** Shumard, 1855; 1st and 2d Ann. Rept. Geol. Survey Missouri, p. 195, pl. B, fig. 15. Lower Magnesian.

—— **subquadrata** Jones, 1889; American Geologist, vol. 4, p. 340, pl., figs. 4 a–d. Lower Helderberg.

—— *troyensis* Ford. (See **Aristozoe troyensis.**)

—— **unicornis** Ulrich, 1879; Jour. Cincinnati Soc. Nat. Hist., vol. 2, p. 10, pl. 7, figs. 4, 4 a, b. Hudson.

Referred by Prof. T. R. Jones to *Primitia unicornis*.

—— **ventralis** Billings, 1865; Pal. Fossils, vol. 1, p. 300. Quebec.

Lepidocoleus Faber, 1886; Jour. Cincinnati Soc. Nat. Hist., vol. 9, p. 15.

—— **jamesi** (Hall and Whitfield) Faber, 1886; *idem*, vol. 9, p. 15, pl. 1, figs. a–f. Hudson.

For other references, see **Pumulites jamesi.**

Lisgocaris Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 478.

—— **lutheri** Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 478, pl. 1, fig. 5. Hamilton.

Mesothyra Hall, 1888; Pal. New York, vol. 7, p. 187.

—— [*Dithyrocaris*] **neptuni** Hall, 1876; Illus. Devonian Fos., pl. 23 (not pl. 22, figs. 1–5); pl. 23, figs. 1–3. Hamilton.

—— [*Dithyrocaris*] **neptuni** Packard, 1878; 12th Rept. U. S. Geol. Survey Territories, p. 452, fig. 73.

—— [*Dithyrocaris*] **neptuni** Etheridge, Woodward, and Jones, 1887; 5th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

—— **neptuni** Hall, 1888; Pal. New York, vol. 7, p. 191, pl. 32, fig. 7; pl. 33, fig. 1.

—— **neptuni** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

Syn., *oceani* Hall, 1888; Pal. New York, vol. 7, p. 187, pl. 32, figs. 1–6; pl. 33, fig. 4–7; pl. 34, figs. 1–5. Portage.

—— [*Dithyrocaris*] **neptuni** Hall, 1876; Illus. Devonian Foss., pl. 22, figs. 1–5; pl. 33, figs. 1–3.

Mesothyra [*Dithyrocaris*] **neptuni** Etheridge, Woodward, and Jones, 1887; 5th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

Syn., *Mesothyra oceani* Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

—— **stumea** Hall, 1888; Pal. New York, vol. 7, p. 193, pl. 32, figs. 8, 9; pl. 34, fig. 2. Hamilton.

—— **stumea** Etheridge, Woodward and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

—— [*Dithyrocaris?*] **veneris** Hall, 1888; Pal. New York, vol. 7, p. 193, pl. 33, fig. 3. Hamilton.

—— [*Dithyrocaris?*] **veneris** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

Neolimulus Woodward, 1868; Geol. Mag., vol. 5, p. 1.

Type, *Neolimulus falcatus* Woodward.

Nothozoe Barrande, 1872; Syst. Sil. Bohême, vol. 1, suppl., p. 536.

Type, *Nothozoe pollens* Barrande.

—— **vermontana** Whitfield, 1884; Bull. Am. Mus. Nat. Hist., vol. 1, p. 144, pl. 14, figs. 14, 15. Potsdam.

Palæocaris Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 48.

—— **typus** Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 49.

Syn., *Acanthotelson inæqualis* Meek and Worthen, 1865; Proc. Acad. Nat. Sci. Phila., vol. 17, p. 48. Coal Measures.

Acanthotelson inæqualis Meek and Worthen, 1866; Geol. Illinois, vol. 2, p. 403, pl. 32, fig. 7, 7 a.

—— **typus**, Meek and Worthen, 1866; Geol. Illinois, vol. 2, p. 405, pl. 32, figs. 5 a–d.

—— **typus** Meek and Worthen, 1868; Geol. Illinois, vol. 3, p. 552, figs. a, b.

—— **typus** Peach, 1880; Trans. Royal Soc. Edinburgh, vol. 30, p. 85, pl. 10, figs. 10 g, 10 h.

—— **typus** Brocchi, 1880; Bull. Soc. Géol. France, vol. 8, p. 9, pl. 1, figs. 8–10.

—— **typus** Woodward, 1881; Geol. Mag., decade 2, vol. 8, p. 533, wood-cut.

—— **typus** White, 1884; 13th Ann. Rept. Dept. Geol. Nat. Hist. Indiana, p. 179, pl. 38, figs. 1. 2, 3.

—— **typus** Packard, 1885; Am. Naturalist, vol. 19, p. 790.

—— **typus** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 129, pl. 3, figs. 1–4; pl. 7, figs. 1, 2.

Palæocrangon Salter, 1861. (See **Crangopsis** Salter, 1863.)

Palæopalæmon Whitfield, 1880; Am. Jour. Sci., 3d series, vol. 19, p. 40.

—— **newberryi** Whitfield, 1880; Am. Jour. Sci., 2d series, vol. 19, p. 41. Erie.

—— **newberryi** Whitfield, 1880; Author's Edition, plate, figs. 1, 2, 3.

—— **newberryi** Hall, 1888; Pal. New York, vol. 7, p. 203, pl. 30, figs. 20–23.

Palæocreusia Clarke, 1888; Pal. New York, vol. 7, p. 210.

—— **devonica** Clarke, 1883; Pal. New York, vol. 7, p. 210, pl. 36, figs. 24, 26. Corniferous.

Plumulites Barrande, 1872; Syst. Sil. Bohême, suppl., vol. 1, p. 565.

—— **devonicus** Clarke, 1882; Am. Journ. Sci., 3d series, vol. 24, p. 55, figs. 1, 2. Hamilton.

—— **jamesi** Hall and Whitfield, 1875; Pal. Ohio, vol. 2, p. 106, pl. 4, figs. 1–3. Hudson.

——? **jamesi** Miller, 1875; Cincinnati Quart. Jour. Sci., vol. 2, p. 275, fig. 19.

Referred by Faber (Jour. Cincinnati Soc. Nat. Hist., vol. 9, 1886, p. 15) to a new genus under the name of *Lepidocoleus*.

—— **newberryi** Whitfield, 1881; Annals New York Acad. Sci., vol. 2, p. 217. Huron.

Prestwichia Woodward, 1867; Quart. Jour. Geol. Soc. London, vol. 23, p. 32.

Prestwichia danæ (Meek and Worthen) Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 146, pl. 5, figs. 3, 39; pl. 6, figs. 1 a, 2, 2 a.

For other references to this species, see **Euproops** and **Belinurus**.

—— *eriensis* Williams. (See **Protolimulus eriensis.**)

Protolimulus Packard, 1866; Mem. Nat. Acad. Sci., vol. 3, p. 150.

—— [*Prestwichia*] **eriensis** Williams, 1885; Am. Jour. Sci., 3d series, vol. 30, p. 45, 3 figs. Devonian.

—— [*Protolimulus*] **eriensis** Packard, 1886; Mem. Nat. Acad. Sci., vol. 3, p. 150, figs. 11-13.

—— **eriensis** Hall, 1888; Pal. New York, vol. 7, p. 153, pl. 26, figs. 1, 2.

Primitia Jones and Holl, 1865; Annals Mag. Nat. Hist., 3d series, London, vol. 16, p. 415.

Primitia *cristata* Whitfield, 1889; Bull. Am. Mus. Nat. Hist., New York, vol. 2, p. 59, pl. 13, figs. 1, 2. (See **Isochilina cristata.**)

—— *gregaria* Whitfield, 1889; Bull. Am. Mus. Nat. Hist., New York, vol. 2, p. 58, pl. 13, figs. 3-5. (See **Isochilina gregaria.**)

—— **lativia** Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 50, pl. 9, figs. 8, 8 a. Hudson.

—— [*Beyrichia*] *logani* var. *leperditioides* Jones, 1858; Annals and Mag. Nat. Hist., London, 3d series, vol. 1, p. 244, pl. 9, fig. 10. Trenton.

—— [*Beyrichia*] *logani* var. *leperditoides* Jones, 1858; Geol. Survey Canada, decade 3, p. 91, pl. 11, figs. 1-5.

—— **leperditioides** Jones, 1884; Annals and Mag. Nat. Hist., 6th series, London, vol. 14, p. 345.

—— **mundula** Jones, 1889; American Geologist, vol. 4, p. 337, pl., figs. 1, 2, 10, 15. Upper Devonian.

—— [*Beyrichia* (*Primitia*)] **occidentalis** Walcott, 1884; Pal. Eureka Dist., Mon. U. S. Geol. Survey, vol. 8, p. 204, pl. 17, figs. 4, 4 a. Devonian.

—— [*Beyrichia?*] **parallela** Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 51, pl. 9, figs. 7-7 a. Hudson.

—— **pennsylvanica** Jones, 1889; American Geologist, vol. 4, p. 339, pl., figs. 15 a, b. Marcellus.

—— **seminulum** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 5, pl. 2, fig. 2. Hamilton.

—— *seelyi* Whitfield, 1889; Bull. Am. Mus. Nat. Hist., N. Y., vol. 2, p. 60, pl. 13, figs. 15-21. (See **Isochilina seelyi.**)

—— **unicornis** (Ulrich) Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 7, pl. 11, figs. 8-13.

For other references, see **Beyrichia unicornis** Ulrich. The species is referred by Ulrich (Contributions Micro-Palæont., pt. 2, p. 50) to *Aparchites unicornis*, pl. 9, fig. 11.

—— **whitfieldi** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 9, pl. 3, figs. 24 a, b. Cincinnati.

Primitiopsis Jones, 1887; Notes on some Sil. Ostracoda from Gothland, p. 5.

—— **punctulifera** (Hall) Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 9, pl. 2, figs. 7 a, b, 12 a, b. Hamilton.

For other references, see **Beyrichia punctulifera** Hall.

Protobalanus Whitfield, 1889; Bull. Am. Mus. Nat. Hist., New York, vol. 2, p. 66; Hall, 1888; Pal. New York, vol. 7, pp. lxii and 209.

—— **hamiltonensis** (Whitfield) Hall, 1888; Pal. New York, vol. 7, p. 209, pl. 36, fig. 23.

—— **hamiltonensis** Whitfield, 1889; Bull. Am. Mus. Nat. Hist., New York, vol. 2, p. 67, pl. 13, fig. 22. Marcellus.

Protocaris Walcott, 1884; Bull. U. S. Geol. Survey, No. 10, p. 50.

—— ***marshi* Walcott, 1884**; Bull. U. S. Geol. Survey, No. 10, p. 50, pl. 10. Cambrian.

—— ***marshi* Walcott, 1886**; Bull. U. S. Geol. Survey, No. 30, p. 148, pl. 15, fig. 1.

Pterygotus Agassiz, 1844; Mon. Poissons Fossiles, note, p. xix.

—— **acuticauda** Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 42, pl. 2, fig. 3. Waterlime.

—— **bilobus** (Huxley and Salter) Pohlman, 1886; Bull. Buffalo Soc. Nat. Sci., vol. 5, p. 27. Waterlime.

—— **buffaloensis** Pohlman, 1881; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 17, figs. 1, 2. Waterlime.

—— **buffaloensis** Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 44, pl. 3, fig. 3.

—— **buffaloensis** Pohlman, 1886; Bull. Buffalo Soc. Nat. Sci., vol. 5, p. 24, pl. 3, fig. 1.

—— **canadensis** Dawson, 1881; Canadian Naturalist, new series, vol. 9, p. 103, figs. 1, 2. Niagara.

—— **cobbi** Hall, 1859; Pal., New York, vol. 3, p. 417, pl. 83 b, fig. 4; pl. 84, fig. 8 (?). Waterlime.

—— **cummingsi** Grote and Pitt, 1875; Bull. Buffalo Soc. Nat. Sci., vol. 3, p. 18, figure. Waterlime.

—— **cummingsi** Grote and Pitt, 1878; Proc. Am. Assoc. Adv. Sci., 26th Meeting, p. 300, figure.

—— **globicaudatus** Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 42, pl. 2, fig. 2. Waterlime.

—— **macrophthalmus** Hall, 1859; Pal. New York, vol. 3, p. 418, pl. 80 a, figs. 8, 8 a. Waterlime.

—— **macrophthalmus** Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 44.

—— **osborni** Hall, 1859; Pal. New York, vol. 3, p. 419, pl. 80 a, fig. 9. Waterlime.

—— **quadricaudatus** Pohlman, 1882; Bull. Buffalo Soc. Nat. Sci., vol. 4, p. 43, pl. 3, fig. 1. Waterlime.

Rachura Scudder, 1878; Proc. Boston Soc. Nat. Hist., vol. 19, p. 296.

Probably the same as the genus *Dithyocaris*.

—— *venosa* Scudder, 1878; Proc. Boston Soc. Nat. Hist., vol. 19, p. 296. Coal Measures.

—— [*Dithyocaris ?*] *venosa* Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda, p. 4.

Rhinocaris Clarke, 1888; Pal. New York, vol. 7, p. lviii.

—— **columbina** Clarke, 1888; Pal. New York, vol. 7, p. 195, pl. 31, figs. 16–21. Hamilton.

—— **columbina** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda, etc., p. 8.

—— **scaphoptera** Hall, 1888; Pal. New York, vol. 7, p. 197, pl. 31, figs. 22, 23. Hamilton.

—— **scaphoptera** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

Schizodiscus Clarke, 1888; Pal. New York, vol. 7, p. 207.

—— **capra** Clarke, 1888; Pal. New York, vol. 7, p. 207, pl. 25, figs. 1-9. Hamilton.

Spathiocaris Clarke, 1882; Am. Jour. Sci., 3d series, vol 23, p. 477.

—— **emersoni** Clarke, 1882; Am. Jour. Sci., 3d series, vol. 23, p. 477, pl., figs. 1-3. Hamilton.

—— **emersoni** Packard, 1883; 12th Rept. U. S. Geol. Survey Territories, p. 451.

—— **emersoni** Clarke, 1886; Neues Jarbuch für Mineral., p. 180.

—— **emersoni** Woodward and Jones, 1884; 2d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 7.

—— **emersoni** Clarke, 1885; Bull. U. S. Geol. Survey, No. 16, p. 46.

—— **emersoni** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 3.

—— **emersoni** Hall, 1888; Pal. New York, vol. 7, p. 199, pl. 35, figs. 12–18.

—— **emersoni** Etheridge, Woodward, and Jones, 1888; 6th Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 8.

Solenocaris Meek, 1871; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335.

The name *Solenocaris* was used for a species of fossil crustacea by Mr. J. Young in 1868. Change to *Strigocaris*.

—— *ludovici* Worthen, 1884; Bull. Illinois State Cab. Nat. Hist., No. 2, p. 3. St. Louis.

—— [*Ceratiocaris* (*Solenocaris*)] *strigata* Meek, 1872; Proc. Acad. Nat. Sci. Phila., vol. 23, p. 335. Waverly.

—— [*Ceratiocaris* (*Solenocaris*)] *strigata* Meek, 1875; Pal. Ohio, vol. 2, p. 321, pl. 18, figs. 4 a–c.

Strigocaris, name suggested to replace preoccupied generic name *Solenocaris* (Meek) Vogdes, 1889; Annals N. Y. Acad. Sci., vol. 5, p. 34.

—— [*Solenocaris*] **st. ludovici** Worthen, 1884; Bull. Illinois State Cab. Nat. Hist., No. 2, p. 3. St. Louis.

—— [*Ceratiocaris* (*Solenocaris*)] **strigata** Meek, 1872; Proc. Nat. Acad. Sci. Phila., vol. 23, p. 335. Waverly.

—— [*Ceratiocaris* (*Solenocaris*)] **strigata** Meek, 1875; Pal. Ohio, vol. 2, p. 321, pl. 18, figs. 4 a–c.

Strobilepsis Clarke, 1888; Pal. New York, vol. 7, p. 212.

—— **spinigera** Clarke, 1888; Pal. New York, vol. 7, p. 212, pl. 36, figs. 20–22. Hamilton.

Stylonurus Page, 1856; Advance Text-book Geology.

—— **excelsior** Hall, MSS. Catskill.

—— **excelsior** Martin, 1882; Trans. New York Acad. Sci., vol. 2, p. 8.

—— **excelsior** Hall, 1884; 36th Rept. New York State Mus., p. 77, pl. 5, fig. 1.

—— **excelsior** Hall, 1885; Proc. Am. Assoc. Adv. Sci., 33d Meeting, p. 421.

—— **excelsior** Hall, 1888; Pal. New York, vol. 7, p. 156, pl. 26; also p. 221, pl. 26 a.

Compare ***Dolichocephala lacoana*** Claypole.

—— [*Equisitides*] **wrightianus** Dawson, 1881; Quart. Jour. Geol. Soc., vol. 37, p. 303, pl. 12, fig. 10; pl. 13, fig. 20. Portage.

—— [*Equisitides*] **wrightianus** (Dawson) Wright; 35th Rept. New York State Mus. Nat. Hist., Expl., pl. 15, note, figs. 1, 2.

—— [*Echinocaris*] **wrightianus** Jones and Woodward, 1884; Geol. Mag., decade 3, vol. 1, p. 3, pl. 13, figs. 1 a, b.

—— [*Echinocaris*] **wrightianus** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Fossil Phyllopoda Pal. Rocks, p. 35.

—— ? [*Echinocaris*] **wrightianus** Hall, 1888; Pal. New York, vol. 7, p. 160, pl. 27, figs. 7–9.

Strepula Jones and Holl, 1886; Annals Mag. Nat. Hist., 5th series, London, vol. 17, p. 403.

—— **lunatifera** Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 56, pl. 9, figs. 14, 14 b. Hudson.

—— **quadrilirata** (Hall and Whitfield) Ulrich, 1889; Contributions Micro-Palæont., pt. 2, p. 54, pl. 9, fig. 12.

For other references, see **Beyrichia quadrilirata**.

—— **sigmoidalis** Jones, 1890; Quart. Jour. Geol. Soc., vol. 46, p. 11, pl. 2, fig. 4. Hamilton.

Tropidocaris Beecher, 1884; 2d Geol. Survey Pennsylvania, vol. PPP, p. 15.

—— **alternata** Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 19, pl. 2, figs. 7, 8. Chemung.

—— **alternata** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.

—— **alternata** Hall, 1888; Pal. New York, vol. 7, p. 186, pl. 31, figs. 14, 15.

—— **bicarinata** Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 16, pl. 2, figs. 3–5. Chemung.

—— **bicarinata** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.

Tropidocaris bicarinata Hall, 1888; Pal. New York, vol. 7, p. 184, pl. 31, figs. 7–12.
—— **interrupta** Beecher, 1884; 2d Geol. Survey Penn., vol. PPP, p. 18, pl. 2, fig. 5. Chemung.
—— **interrupta** Etheridge, Woodward, and Jones, 1885; 3d Rept. Comm. Foss. Phyllopoda Pal. Rocks, p. 35.
—— **interrupta** Hall, 1888; Pal. New York, vol. 7, p. 185, pl. 31, figs. 7–12.
Turrilepas Woodward, 1865; Quart. Jour. Geol. Soc., vol. 21, p. 489.
—— **cancellatus** Hall, 1888; Pal. New York, vol. 7, p. 216, pl. 36, fig. 2. Corniferous.
—— [*Plumulites*] **devonicus** Clarke, 1882; Am. Jour. Sci., 3d series, vol. 24, p. 55, figs. 1, 2. Hamilton.
—— **devonicus** Hall, 1888; Pal. New York, vol. 7, p. 215, pl. 36, fig. 1.
—— **flexuosus** Hall, 1888; Pal. New York, vol. 7, p. 215, pl. 36, fig. 1. Corniferous.
—— **foliatus** Hall, 1888; Pal. New York, vol. 7, p. 218, pl. 36, fig. 15. Hamilton.
—— [*Plumulites*] **newberryi** Whitfield, 1882; Annals New York Acad. Sci., vol. 2, p. 217. Hamilton.
—— **newberryi** Hall, 1888; Pal. New York, vol. 7, p. 219, pl. 36, figs. 16–19.
—— **nitidulus** Hall, 1888; Pal. New York, vol. 7, p. 218, pl. 36, fig. 4. Hamilton.
—— **squama** Hall, 1888; Pal. New York, vol. 7, p. 217, pl. 36, figs. 5–8. Hamilton.
—— **tener** Hall, 1888; Pal. New York, vol. 7, p. 219, pl. 36, figs. 9–14. Hamilton.

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UNITED STATES GEOLOGICAL SURVEY
J. W. POWELL, DIRECTOR

A REPORT OF WORK DONE
IN THE
DIVISION OF CHEMISTRY AND PHYSICS
MAINLY DURING THE
FISCAL YEAR 1888-'89

F. W. CLARKE, Chief Chemist

WASHINGTON
GOVERNMENT PRINTING OFFICE
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PREFACE.

The present bulletin represents work finished in the Division of Chemistry and Physics during the fiscal year 1888–'89, and resembles in general design and purpose its predecessors, Nos. 9, 27, 42, 55, and 60. It covers, however, only a part of the work actually accomplished, for some investigations are not yet completed, others will appear in special bulletins now in course of preparation, and many analyses will be published in forthcoming reports of the field geologists.

F. W. CLARKE,
Chief Chemist.

WORK DONE IN THE DIVISION OF CHEMISTRY AND PHYSICS IN 1888-'89.

A THEORY OF THE MICA GROUP.

By F. W. Clarke.

Ever since its publication in 1878,[1] in spite of a few dissentient voices, Tschermak's theory of the mica group has been generally in vogue. Nevertheless, upon careful inspection, the theory seems open to serious objections. In brief, omitting details for the present, Tschermak regards the micas as made up of four fundamental molecules; to which the following formulæ are assigned:

1. $R'_6Al_6Si_6O_{24}$.
2. $Mg_{12}Si_6O_{24}$.
3. $H_8Si_{10}O_{24}$.
4. $F_{24}Si_{10}O_8$.

R′ stands obviously for K, Na, Li, or H; Mg is equivalent to Fe″, and aluminum may be replaced by ferric iron. The first of these formulæ represents fairly well the composition of normal muscovite and paragonite; the only objection to it being that, as used by Tschermak, it assumes the double atom of quadrivalent aluminum. Since it has been proved by Nilson and Petterson, Combes, Quincke, and others, that aluminum is truly trivalent, the formula should become $R'_3Al_3Si_3O_{12}$; which, as I have shown in several previous papers, may be regarded as a substitution derivative of normal aluminum orthosilicate.

The second, third, and fourth of Tschermak's formulæ represent hypothetical compounds, the second being a polymer of chrysolite, to which, in nature, some varieties of talc offer the nearest approximation. The third and fourth formulæ are analogous to no known substances, and are, moreover, improbable chemically. No mica, by itself, resembles in composition either of the three. One formula, then, corresponds to an observed mineral, while the others are purely speculative; a state of affairs which is not altogether satisfactory. Furthermore, the four formulæ represent as many distinct chemical types, whereas it would seem as if all the true micas should be reducible to one general form, under which their isomorphism would be more readily intelligible.

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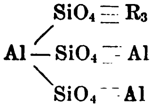
[1] *Ber. Wien. Akad.*, vol. 78, p. 5. Zeitschr. Kryst., vol. 3, p. 122.

There is still another objection to Tschermak's system of formulæ, which, if sustained by future investigation, will be fatal. Under his theory the ratio of oxygen to silicon in the micas can never exceed four to one; while the published analyses of micas often show values far higher, ranging in some cases nearly up to five. In certain instances, as Tschermak himself suggests, this excess of oxygen over the orthosilicate ratio may be due to water inclosed between micaceous laminæ; and in other cases it may indicate partial alteration. There are micas, however, in which neither of these explanations appears to be satisfactory, and the weight of evidence goes to show that the excess of oxygen is essential. If this be true, Tschermak's theory is so far inadequate, for to such micas it can not apply without serious modification. The question can only be settled experimentally, but at present the objection raised by it can not be ignored. Some of its details will be considered later.

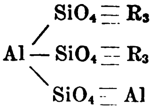
Now, in order to conclusively replace Tschermak's theory by something better, two fundamental conditions must be satisfied. First, all micas, with the possible exception of the pseudomica, margarite, should be reducible to one general type of formula, which shall express all known relations equally well with the formulæ proposed by Tschermak. Secondly, hypothetical compounds must be so far as possible avoided, and admitted into consideration only when their assumption can be shown to be absolutely necessary. The chief difficulties to be overcome are the variations in the silicon-oxygen ratio, and the presence of fluorine in many common micas.

In a number of papers published during the past four years,[1] I have sought to show that all orthosilicates containing aluminum may be represented as substitution derivatives of the normal salt $Al_4(SiO_4)_3$. Muscovite can be so derived, theoretically, through the replacement of one aluminum atom by R'_3; and in many other cases we have equal simplicity of expression. The ferro-magnesian micas, the phlogopites, and the lepidolites, however, are less simply derived; and I have in certain cases suggested a linking together of two orthosilicate nuclei to the group $Al_2(SiO_4)_5$ in order to account for their formation. I am now inclined to believe, however, that all the true micas are referable to the same general type, and have discussed nearly one hundred published analyses from that point of view. If we take magnesium as a generic representative of the bivalent metals, and give univalent elements or groups the general symbol R, we can imagine the following derivatives of $Al_4(SiO_4)_3$ as easily possible:

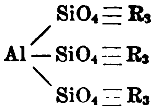
1.



2.



3.



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[1] *Am. Jour. Sci., Nov.,* 1886, and Aug., 1887. Also, Am. Chem. Jour., vol. 10, p. 120 *(March, 1888).*

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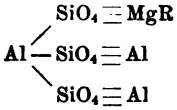

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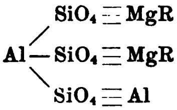

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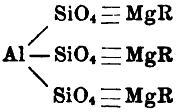

To these we may add, as No. 7, the compound $Al_2(SiO_4)_6Mg_9$, the bivalent analogue of No. 3, and identical in type with it. Now, so long as we have only orthosilicate micas to consider, these seven formulæ cover all their variations in composition; provided that fluorine, when present, is represented either by $-Mg-F$ or $-Al=F_2$, univalent groups which are included under the general symbol R'. Most of the micas appear as intermediate mixtures of these presumably isomorphous types. No. 1 represents muscovite and paragonite, and No. 6 agrees tolerably with some phlogopites. No. 2 may be resolved into a mixture, in equal molecules, of No. 1 and 3; and similarly No. 5 may be regarded as composed of Nos. 4 and 6. Nos. 5 and 6, moreover, may be simplified into mixtures between 3 and 7, so that numbers 1, 3, 4, and 7 represent all the necessary relations. Even No. 4 is possibly superfluous.

So much for the normal orthosilicate micas. But in the lepidolites, phlogopites, and some muscovites, the oxygen silicon ratio is low; and in the lepidolites especially it approximates more or less closely to the metasilicate type. This order of variation is clearly established, while variations in the opposite direction, that is toward excess of oxygen, may be questionable. If, however, in any mica the oxygen can be properly in excess of SiO_4, that excess may be fairly regarded as present in the group $-Al=O$, which is obviously equivalent to $-Al=F_2$, and takes place with the latter as a part of R'. Examples of this kind are given in one of my former papers.[1] In all such cases the system of formulæ proposed above applies perfectly, and needs no qualification. The variations in R' always fall within its limits.

The lower values for the silicon-oxygen ratios are explicable as follows: The polysilicic acid $H_4Si_3O_8$, which, like H_4SiO_4 is tetrabasic, is represented in nature by orthoclase and albite. In anorthite we have an orthosilicate, and its mixture with albite gives, as is well known to all mineralogists, the intermediate triclinic feldspars in which pseudo-metasilicate ratios often appear. $H_4Si_3O_8+H_4SiO_4=H_8Si_4O_{12}=4H_2SiO_3$. If we assume a similar state of affairs among the micas, and regard orthosilicates and polysilicates as isomorphously miscible, the lepidolites and other low oxygen micas are completely accounted for. We have then the same system of general formulæ for all micas, the normal salts $Al_4(SiO_4)_3$ and $Al_4(Si_3O_8)_3$ being the theoretical starting points for derivation. In every case the composition of a mica becomes reducible to the one general type, under the proposed theory of substitution. Representing the groups SiO_4 and Si_3O_8 by the common symbol X, the micas all fall within limits indicated by the formulæ $Al_3X_3R'_3$, and $AlX_3R'_9$. We may test this principle and the preceding formulæ by application to actual examples, taking the different micas group by group.

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[1] Am. Jour. Sci., Aug., 1887, p. 131.

MUSCOVITE.

This mica, the most typical and most abundant of all, is also the simplest chemically. It is best represented by formula No. 1, which, in its special application, becomes ordinarily $Al_3(SiO_4)_3KH_2$, with some variation in the ratio of K to H. In most cases muscovite contains small amounts of magnesia and ferrous iron; and if these are deducted, as shown in formula No. 6, the residue agrees still better with formula No. 1. Fluorine is often present in small quantities, and appears to vary in relation to hydrogen, being the lowest when the latter is high, and the reverse. Hence it is probable that the group AlF_2 replaces H rather than K. This is shown more clearly among the lepidolites, in which fluorine reaches a maximum, while the proportion of water is almost insignificant.

Some muscovites, however, vary from the normal compound in that they contain more silicon and less oxygen; thus approaching somewhat to lepidolite. These micas, which Tschermak has called "phengites," are represented by him as mixtures of $Al_6R'_6Si_6O_{24}$ with $H_8Si_{10}O_{24}$ in the ratio of three to one. It is simpler, however, to follow out the analogy offered by the feldspar group, and to assume the existence in muscovite of the isomorphous compound $Al_3(Si_3O_8)_3KH_2$. True, this compound has not been found by itself in nature, and so far its assumption is objectionable. But the compound $H_8Si_{10}O_{24}$ is also non-existent, is different in type from ordinary muscovite, and is not easily conceivable as a definite entity. The alternative which I offer for it is therefore, it seems to me, more philosophical and more satisfactory; and it accounts completely for all the oxygen variations in muscovite. For the sake of brevity, however, we may well retain the name of *phengite* in our vocabulary, and may speak of micas containing the Si_3O_8 group as more or less *phengitic*.

In order to show the method of discussion which I have employed, we may take the four muscovite analyses considered by Tschermak. A, muscovite from Bengal, analyzed by Blau; B, East Indies, by Sipöcz; C, Rothenkopf in the Zillerthal, by Sipöcz; D, Soboth in Steiermark, by Löbisch. Of these, C and D are phengites.

	A.	B.	C.	D.
SiO_2	45.57	45.71	45.87	48.76
Al_2O_3	36.72	36.57	30.86	29.91
Fe_2O_3	.95	1.19	5.70	4.24
FeO	1.28	1.07	1.69	.41
MgO	.38	.71	1.56	2.63
CaO	.21	.46	.23	.33
K_2O	8.81	9.22	9.07	6.83
Na_2O	.62	.79	.54	2.31
Li_2O	.19	....	....	....
H_2O	5.05	4.83	4.60	4.60
F	.15	.12	....	....
	99.93	100.67	100.12	100.02

Now, computing the molecular ratios in the usual way, uniting ferric oxide with alumina, ferrous iron and lime with the magnesia, and consolidating the alkalies under the general symbol R'_2O, we have the following empirical formulæ for the four micas:

A. $Al_{732}Mg_{30}R'_{220}H_{560}F_6Si_{759}O_{3027}$.
B. $Al_{732}Mg_{39}R'_{222}H_{536}F_6Si_{762}O_{3037}$.
C. $Al_{676}Mg_{66}R'_{212}H_{512}Si_{765}O_{2972}$.
D. $Al_{634}Mg_{78}R'_{220}H_{512}Si_{813}O_{3021}$.

Regarding the fluorine as AlF_2, and uniting it and the H with R′, these formulæ become, almost exactly:

A. $Al_{739}Mg_{30}R'_{783}(SiO_4)_{753}(Si_3O_8)_2$.
B. $Al_{729}Mg_{39}R'_{761}(SiO_4)_{753}(Si_3O_8)_3$.
C. $Al_{676}Mg_{66}R'_{724}(SiO_4)_{699}(Si_3O_8)_{22}$.
D. $Al_{634}Mg_{78}R'_{732}(SiO_4)_{642}(Si_3O_8)_{57}$.

Combining the two acid groups under the indiscriminate symbol X, we have:

A. $Al_{729}Mg_{30}R'_{783}X_{755}$.
B. $Al_{729}Mg_{39}R'_{761}X_{756}$.
C. $Al_{676}Mg_{66}R'_{724}X_{721}$.
D. $Al_{634}Mg_{78}R'_{732}X_{699}$.

These are equivalent to the following mixtures of the isomorphous salts represented by the general formulæ 6, 3, and 1, in the fundamental system above cited:

A. $10\ AlX_3Mg_3R'_3+4\ AlX_3R'_9+238\ Al_3X_3R'_3$.
B. $13\ AlX_3Mg_3R'_3+239\ Al_3X_3R'^3$.
C. $22\ AlX_3Mg_3R'_3+218\ Al_3X_3R'_3$.
D. $26\ AlX_3Mg_3R'_3+7\ AlX_3R'_9+200\ Al_3X_3R'_3$.

In each case the final formulæ vary from the original ratios only to an extent which is ascribable to the minute residual errors of calculation. The new expressions conform perfectly to the evidence of analysis. Eight other muscovite analyses, similarly discussed, gave strictly similar and equally sharp results.

LEPIDOLITE.

In this species, the most phengitic of all the micas, we find little water, high fluorine, and a very notable proportion of lithia. It always occurs with muscovite, and commonly implanted upon the latter in such a way as to clearly indicate its later formation. In composition it is regarded by Tschermak as a mixture of $Al_6K_6Si_6O_{24}$ with $F_{24}Si_{10}O_8$, the former being about half replaced by the corresponding $Al_6Li_6Si_6O_{24}$, and the latter in part by $H_8Si_{10}O_{24}$. The objections to this interpretation have already been pointed out.

Under the new mode of interpretation, lepidolite becomes much simpler. In every case, if we eliminate traces of magnesia and iron, as was done under muscovite, the residue corresponds sharply to a mixture of the two molecules $AlX_3R'_9$ with $Al_3X_3R'_3$, X representing

Si_3O_8 and SiO_4 indiscriminately. In the purest lepidolites these molecules are in the ratio 1 : 1, corresponding to $Al_2X_3R'_6$; but in general the second molecule is slightly in excess, due to small admixtures of normal muscovite. In the discussion of fourteen published analyses of lepidolite the ratio $Si_3O_8 : SiO_4$ varies from 1 : 1 to 1 : 3; and the sum of $Li + AlF_2$ appears to be directly related to the proportion of Si_3O_8. In brief, expanding the general formulæ given above, typical lepidolite may be expressed by the two compounds $Al_3(SiO_4)_3KHLi$ and $Al(Si_3O_8)_3K_3Li_3(AlF_2)_3$ in equal molecules. All the variations may be accounted for by admixtures of muscovite, with sometimes a trivial amount of the magnesium or iron salt, No. 6, as an impurity.

For purposes of illustration, four of the lepidolite analyses may be considered in detail, as follows: E, from Rozena, by Berwerth,[1] F, Juschakova, by Rammelsberg;[2] G, Schüttenhofen, by Scharizer;[3] H, white lepidolite from Norway, Maine, by Riggs.[4]

	E.	F.	G.	H.
SiO_2	50.98	50.96	49.26	49.52
Al_2O_3	27.80	22.20	25.26	28.80
Fe_2O_3				.40
Mn_2O_3		5.38		
MnO			.85	.07
FeO	.05		.84	.24
MgO				.02
CaO				.13
K_2O	10.78	11.39	13.85	12.63
Na_2O		.32	.35	.13
Li_2O	5.88	5.65	5.38	3.87
H_2O	.96		1.76	1.72
F	7.88	8.58	5.68	5.18
P_2O_5	.05			
SnO_2			.06	
	104.38	104.48	103.29	102.71
Less O	3.32	3.61	2.38	2.18
	101.06	100.87	100.91	100.53

Disregarding trivial impurities, and computing the ratios as before, we have from these analyses the subjoined empirical expressions:

E. $Al_{347}K_{230}Li_{392}H_{106}(AlF_2)_{207}(Si_3O_8)_{181}(SiO_4)_{306}$.
F. $Al_{280}K_{252}Li_{376}(AlF_2)_{226}(Si_3O_8)_{212}(SiO_4)_{212}$.
G. $Al_{345}R''_{24}K_{250}Li_{358}H_{196}(AlF_2)_{149}(Si_3O_8)_{156}(SiO_4)_{353}$.
H. $Al_{434}R''_{7}K_{272}Li_{258}H_{192}(AlF_2)_{136}(Si_3O_8)_{141}(SiO_4)_{403}$.

Condensing, these become:

E. $Al_{347}R'_{935}X_{487}$.
F. $Al_{280}R'_{854}X_{424}$.
G. $Al_{345}R''_{24}R'_{953}X_{509}$.
H. $Al_{434}R''_{7}R'_{858}X_{544}$.

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[1] *See Tschermak's* paper, l. c.

[2] *Wiedemann's* Annalen, vol. 7, p. 143.

[3] Zeitschr. Kryst., vol. 13, p. 467.

[4] Am. Jour. Sci., Nov. 1886.

Whence we get, very nearly:

E. $70\ AlX_3R'_9+92\ Al_3X_3R'_3$
F. $71\ AlX_3R'_9+70\ Al_3X_3R'_3$.
G. $8\ AlX_3R''_3R'_3+75\ AlX_3R'_9+87\ Al_3X_3R'_3$.
H. $2\ AlX_3R''_3R'_3+52\ AlX_3R'_9+127\ Al_3X_3R'_3$.

Two other highly fluoriferous lithia micas, cryophyllite and zinnwaldite, may properly be considered here. For the former we have Riggs's analysis, and for the latter, analyses by Berwerth and Rammelsberg. From these analyses we get the following empirical formulæ: 1, Riggs, cryophyllite; 2 and 3, Berwerth and Rammelsberg, zinnwaldite.

1. $Al_{186}Fe''_{94}K_{256}Li_{324}H_{146}(AlF_2)_{178}(Si_3O_8)_{227}(SiO_4)_{185}$.
2. $Al_{239}Fe''_{186}K_{236}Li_{218}H_{102}(AlF_2)_{209}(Si_3O_8)_{151}(SiO_4)_{312}$.
3. $Al_{244}Fe''_{167}K_{242}Li_{224}H_{116}(AlF_2)_{200}(Si_3O_8)_{156}(SiO_4)_{306}$.

Condensing these formulæ they become:

1. $Al_{186}Fe_{94}R'_{904}X_{412}$.
2. $Al_{239}Fe_{186}R'_{765}X_{463}$.
3. $Al_{244}Fe_{167}R'_{782}X_{462}$.

Expanding again, these formulæ give:

1. $31\ (AlX_3Fe''_3R'_3)+81(AlX_3R'_9)+25(Al_3X_3R'_3)$.
2. 62 “ +49 “ +43 “
3. 56 “ +53 “ +45 “

The component molecules here correspond essentially to Nos. 6, 3, and 1 of the fundamental series, the last one in each expression being muscovite. Whether the separate components of R′ and X can be distributed with certainty among the several molecules is an outstanding question; but not, I believe, an unanswerable one.

PHLOGOPITE.

In order to ascertain the composition of this mica I have discussed the four analyses cited by Tschermak (l. c.), and three of Rammelsberg's.[1] All of these are fluoriferous, and all but one are phengitic, the exception in the latter case being the Edwards, N. Y., mineral, which Tschermak regards as somewhat altered. I have also considered the new phlogopite from Edwards, recently described by Penfield,[2] which is remarkable as being free from fluorine.

In general, phlogopite agrees closely with the formula $AlX_3Mg_3R'_3$, but there are often variations which are not easy to explain, and which are greater than can be accounted for by presumable errors of analysis. They may be due in part to impurities arising from the great alterability of the mineral; but I am inclined to trace the difficulties to other sources.

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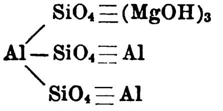
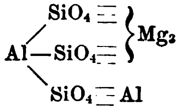
[1] *Wiedemann's Annalen*, vol. 9, p. 129.

[2] Am. Jour. Sci. (3), vol. 36, p. 329.

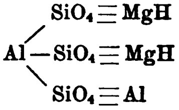
In order to satisfy the conditions of the formulæ proposed by me, it is necessary that the aluminum atoms, apart from AlF_2, shall be in number at least one-third of X; but in several phlogopites the alumina is too low to fulfill this requirement, and the difficulty is best obviated by assuming an MgF group in place of AlF_2. In Penfield's phlogopite, however, there is no fluorine, and yet the alumina is considerably—about two per cent—too low. If we suppose in his mineral, which came from a talc mine, a small admixture of talc, the residue agrees with the theoretical formula, X being wholly SiO_4; but if that impurity is absent we must assume that the mica differs from ordinary phlogopite by containing the group —Mg—OH instead of the usual MgF. The composition of the mineral then reduces to the uniform type. I am now disposed to believe that phlogopite differs from the other micas in that it contains these special groups MgF and MgOH, both as part of R′; but the supposition is not yet fully justified. It is, however, I think, susceptible of experimental investigation, and a laboratory research upon the problem is now being carried out under my direction. Apart from that, the supposition is strengthened by the composition of certain vermiculites, some of which have certainly been formed by the alteration of phlogopite. Three of these interesting minerals are represented fairly well by the subjoined formulæ, in which ferric iron, present in small quantities, has been reckoned with the alumina.



$+3H_2O.$
Dudleyite.



$+3H_2O.$
Culsageeite.



$+3H_2O.$
Jefferisite.

It is by no means certain that the vermiculites are so simple in composition or so definite as these symbols would seem to indicate; but the formulæ are decidedly suggestive, and they show how clearly the relations between the micas and their derivatives may be expressed.

THE FERRO-MAGNESIAN MICAS.

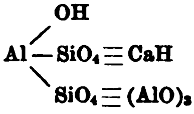
This group of micas, which includes biotite, lepidomelane, annite, haughtonite, siderophyllite, and other supposed species, is apparently quite complex. In place of magnesia, ferrous iron is often predominant; in the lepidomelanes, ferric iron replaces aluminum, and in forty-four out of the fifty-six analyses discussed, the oxygen was in excess of SiO_4. Only seven of these micas appeared to be phengitic; and only sixteen of the analyses reported fluorine in small quantities. In six instances AlO and AlF_2, were both absent.

For thirty-four of the micas in this group, formulæ could be easily computed upon the lines already followed; that is, in each case the composition was represented by a mixture of $AlX_3R''_3R'_3$ with $AlX_3R'_9$ and $Al_3X_3R'_3$, the second or third of these molecules being occasionally absent. Among the lepidomelanes there was an approximation to a distinctively muscovitic type; and in two cases formula No. 4, $Al_3X_3R''R$, seemed to apply. With each mica an attempt was made to determine the proportions of the several admixed molecules; but the results, although numerically conformable to the general theory, were not absolutely conclusive. The chief difficulty lay in the uncertainty attaching to the water determinations, upon which the question of oxygen excesses depends. Since water has a low molecular weight, a small error in its estimation becomes relatively large in the molecular ratios, and two sorts of errors are presumable: First, an excess of water may be inclosed mechanically in the material analyzed, and secondly, a determination by simple ignition is likely to be too low because of the oxidation of ferrous iron. If these errors occur together, they obviously tend to compensate each other; but either one alone seriously affects the co-efficient of R', and appears in the ratio between $Al_3X_3R'_3$ and $AlX_3R'_9$.

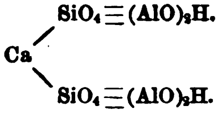
In twenty-two of the fifty-six analyses, however, the symbol $AlX_3R''_3R'_3$ failed to account for all the bivalent metals, iron and magnesium. In these cases R'' was in excess of R', and it became necessary to make use of formula No. 7, $Al_2(SiO_4)_6R''_9$. With the aid of this expression all the ferro-magnesian micas, without a positive exception, including the phlogopites, were resolvable into mixtures of $Al_3X_3R'_3$, $AlX_3R'_9$, and $Al_2X_6R''_9$. Upon this basis formula No. 6 becomes useless, for $AlX_3Mg_3R'_3$ is evidently equivalent to a mixture, in equal molecules, of $AlX_3R'_9$ and $Al_2X_6Mg_9$. All micas, then, so far as the analyses are authentic, may be represented as mixtures of the molecules 1, 3, and 7, these being symbols of one and the same general type. The magnesium (or ferrous) salt thus assumed, moreover, is not absolutely hypothetical; for, with six molecules of water of crystallization added, it approximates to certain individuals of the chlorite group. Some examples of penninite, for instance, approach rather closely to the composition $Al_2(SiO_4)_6Mg_9 . 6H_2O$, which requires 38.71 of silica, 10.97 alumina, 38.71 magnesia, and 11.61 water. We have thus a clue to the constitution of the chlorites, by means of which they may be brought into simple relation with the micas. This problem is now under investigation, and I can only state as a probability that most of the chlorites, if not all, may be represented as mixtures of three fundamental molecules, $Al_2X_6R''_9, 6H_2O$; $AlX_3R''_3H_3, 3H_2O$, and $Al_2X_3(MgOH)_6$. I hope to speak more positively upon this subject before long; at present I need only point out that two of these molecules are simple hydrates of Nos. 6 and 7, while the third is covered by the general symbol No. 3, in which R'_6 becomes $(MgOH)_6$. The easy alterability of garnet, $Al_2(SiO_4)_3R''_3$ into mica and chlorite, is a suggestive bit of evidence bearing upon these *expressions.*

MARGARITE.

Whether this species is to be considered as a true mica or not, is perhaps an open question. Its composition is relatively simple, and is represented by the empirical formula $H_2CaAl_4Si_2O_{12}$. Structurally, this may be written in two distinct ways, as follows:



or

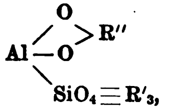


The first of these symbols derives the compound from the normal aluminum salt, and indicates a similarity of type with the micas proper. The second assumes a normal calcium salt as the point of derivation; and I am unable as yet to assign a distinct preference to either expression. A careful study of the genesis and associations of margarite may determine which of the two formulæ is the better. Possibly the occurrence of the mineral in such mixtures as euphyllite, and the probable existence of a similar barium salt in œllacherite points to the first of the two formulæ as the better. The common occurrence of margarite with diaspore also points in the same direction. Corundophilite, which occurs associated with both margarite and diaspore, also reduces to a type resembling the first margarite formula.

THE CLINTONITE GROUP.

These minerals, the so-called "brittle micas," have also been discussed by Tschermak,[1] who includes under this heading seybertite, brandisite, xanthophyllite, chloritoid, masonite, ottrelite, sismondine, and sapphirine. Physically, they are closely related to the micas proper, and to margarite in particular; but chemically they are much more basic. The first three species Tschermak regards as mixtures of the hypothetical compounds $H_2CaMg_4Si_3O_{12}$ and $H_2CaMgAl_6O_{12}$; to chloritoid he assigns the composition $H_2Si_2Fe''_2O_7, \times H_2Al_4O_7$, and sapphirine he represents by the formula $Si_2Mg_2O_6+Al_6Mg_2O_{11}$.

Using the analyses cited by Tschermak, I find that all these minerals, with the possible exception of sapphirine, may be represented by the general expression



which is clearly and directly related to the formulæ already assigned to the micas and to margarite, and in which the mode of union of R″ with Al, when R″=Mg, suggests the common association of members of this group with spinel. In seybertite we have a mixture of

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[1] Zeitschr. Kryst., vol. 3, p. 496.

$AlO_2R''SiO_4(MgOH)_3$ with $AlO_2R''SiO_4(AlO)_3$, R'' being partly Ca and partly Mg. In brandisite we have a similar constitution, with about one-fourth of R'' replaced by H_2. In chloritoid, $R''=Fe$ and $R'_3=H_2(AlO)$; and sismondine is similar, with R'_3 possibly replaced in part by Al. The compound $AlO_2MgSiO_4(AlO)_3$, found in seybertite, is a rough approximation to sapphirine, which mineral possibly has this composition plus some impurities as yet unidentified. A wider range of analyses is needed in order to establish these formulæ completely; but they seem to have distinct advantages over the formulæ proposed by Tschermak.

CONCLUSIONS.

All the micas, vermiculites, chlorites, margarite, and the clintonite group may be simply represented as isomorphous mixtures, every constituent being a substitution derivative of normal aluminum polysilicate or orthosilicate. To the latter compound a structure may be assigned somewhat different in form from the one I have chosen, without affecting in any notable way the general system adopted. Upon this basis all the minerals named are reducible to the same general type, which accounts for observed isomorphisms, and for the relations of the micas to other species, with fewer assumptions of hypothetical compounds than are necessary under other known schemes of interpretation. In most cases the evidence is clear, direct, and conclusive; in other cases, few in number, it is at present somewhat obscure. It may be claimed, without extravagance, that the formulæ have the merit of suggestiveness, and that they form a scientific basis for future research.

A PLATINIFEROUS NICKEL ORE FROM CANADA

By F. W. Clarke and Charles Catlett.

During the autumn of 1888 we received, through two different channels, samples of nickel ores taken from the mines of the Canadian Copper Company at Sudbury, Ontario. From one source we obtained two masses of sulphides, to be examined for nickel and copper; from the other source came similar sulphides, together with a series of soil and gravel-like material, seven samples in all. In the latter case an examination for platinum was requested, and in five of the samples it was found, the gravel above mentioned yielding 74.85 ounces of metals of the platinum group to the ton of 2,000 pounds. At the outset of the investigation we were decidedly incredulous as to the existence of platinum in such ores; but the discovery of sperrylite by Mr. Wells in material from the same mines gave our work a wholesome stimulus, and the assays were carefully carried through.

The sulphide ores submitted to us from Sudbury were all of similar character. They consisted of mixed masses, in which a gray readily tarnishing substance was predominant, with some chalcopyrite, possibly some pyrite, and a very little quartz. Two samples were examined in mass; one gave 31.41 per cent of nickel with a little copper, the other gave 35.39 per cent of nickel and 5.20 of copper. The nickel mineral itself proved to be a suphide of nickel and iron, and as ores of that composition are not common, it was thought desirable to examine the substance further.

As above stated, the nickel mineral is the predominating constituent of the masses submitted for examination. It is steel gray, massive, and exceedingly alterable in the air, and its specific gravity, determined by pycnometer, is 4.541. An analysis of carefully selected material gave the following results:

Ni	41.96
Fe	15.57
SiO_2	1.02
Cu	.62
S	40.80
	99.97

Neither cobalt nor arsenic could be detected.

The foregoing figures work out sharply into the ratio R : S :: 4 : 5; and approximately into the formula Ni_3FeS_5. If we deduct silica, together with the copper reckoned as admixed chalcopyrite, and recalculate the remainder of the analysis to 100 per cent, we have the following figures:

	As found.	Calc. as Ni_3FeS_5.
Ni	43.18	44.6
Fe	15.47	14.4
S	41.35	41.0
	100.00	100.0

In short, the mineral has the composition Ni_4S_5, with *about* one-fourth of the nickel replaced by iron. The only known species with which this agrees is Laspeyres's polydymite, of which the Sudbury mineral is evidently a ferriferous variety. What relations it may bear toward beyrichite, pyrrhotite, etc., is as yet a matter of considerable uncertainty. Probably in most cases the nickeliferous constituent of pyrrhotite is millerite, but other sulphides, like the polydymite, may perhaps occur also.

The polydymite which was selected for the above analysis came from the mass in which, in average, 35.39 Ni and 5.20 Cu had previously been found. The mass weighed several kilograms, and was remarkably free from quartz. The same mass, with two smaller pieces resembling it, were also examined for platinum, by the following method: One assay ton of the finely ground ore was treated with nitric acid until all or practically all of the sulphides had been dissolved. The dried residue was then assayed in the usual manner; except that, to facilitate cupellation, a little pure silver was introduced into the lead button. From the final bead the silver was dissolved out by sulphuric acid, leaving the platinum in a finely divided gray powder. The latter dissolved easily in aqua regia, and gave all the reactions needful to identify it thoroughly. The results were as follows, "A" representing the large mass in which the polydymite was determined:

	Per cent.
A, 2.55 ounces Pt to the ton, or	0.0087
B, 1.8 ounces Pt to the ton, or	.0060
C, 7 ounces Pt to the ton, or	.0240

That the metal weighed was nearly all platinum is certain; but it may have contained small amounts of other metals of the same group. The material separated was not sufficient to warrant a search for the rarer associates of platinum. Probably the platinum exists in the ore as sperrylite, although this point was not proved. The amount of platinum in the mass most thoroughly examined would require, to form sperrylite, only about 0.007 per cent of arsenic, which is too small a quantity for detection by ordinary analysis. That platinum should exist in appreciable quantities in an ore of such character is something quite extraordinary. Whether it could be profitably extracted is an open question.

A NEW OCCURRENCE OF GYROLITE.

By F. W. Clarke.

In the autumn of 1888, during a visit to the New Almaden Quicksilver Mine in California, Dr. D. T. Day, of the U. S. Geological Survey, was shown specimens of a mineral which was locally supposed to be white fluor-spar. It occurred in well-developed crystals lining crevice veins in the mine, and was easily recognizable as apophyllite. Dr. Day secured a good series of the specimens, and finally turned them over to me for examination. The largest crystals were about two centimeters in diameter, and fairly transparent, and grew out of crystalline masses of considerable thickness, the exposed definite faces nearly meeting at the center of the seam or vein. All of the specimens were saturated with bituminous matter, but except for that staining they were quite colorless.

In several of the specimens received the wall of the seam was distinctly shown, and between it and the crystalline apophyllite there was a fibrous layer from one to three centimeters in thickness. That layer was also colorless, except for bituminous staining, and on account of its relations to the apophyllite it appeared to deserve investigation. A sufficient quantity of the material having been selected, it was digested for about twenty-four hours with ether in order to cleanse it from bitumen, and then analyzed. I give the result in comparison with How's figures for a Nova Scotia gyrolite:

	Clarke.	How.
H_2O	14.60	15.05
SiO_2	52.54	51.90
Al_2O_3	0.71	1.27
Fe_2O_3		....
CaO	29.97	29.95
MgO	....	0.08
K_2O	1.56	1.60
Na_2O	0.27	....
F	0.65	....
	100.30	99.85
Less O	0.27	....
	100.03	....

It will at once be seen that the two analyses, except for the small amount of fluorine, coincide quite sharply, and establish the New Almaden mineral as gyrolite. The Nova Scotian gyrolite is also associated with apophyllite, from which species How supposed it to be derived.[1] In the present instance, however, the relative position of the two minerals in the vein suggests that the gyrolite is the older; and that the apophyllite may have been formed from it by a partial solution and redeposition of its material through the agency of waters containing alkaline fluorides. The gyrolite is obviously not absolutely pure, but it agrees approximately with the formula $Ca_2Si_3O_8 . 3H_2O$. Its chemical structure and relations to apophyllite are not altogether clear.

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[1] Am. Jour. Sci, (2), vol. 32, p. 13.

ANALYSES OF THREE DESCLOIZITES FROM NEW LOCALITIES.

By W. F. Hillebrand.

1. MAYFLOWER MINE, BALD MOUNTAIN MINING DISTRICT, BEAVERHEAD COUNTY, MONT.

Through Messrs. W. H. Beck and George E. Lemon, of Washington, D. C., was received about a year ago for examination a large lump of friable, uncrystallized material, having a dull yellow to pale orange color, and consisting chiefly of a vanadate, but carrying a large percentage of gangue. Two samples as pure as could be selected from different parts of the lump were analyzed with the following results:

	I.	II.	Mean.	Molecular ratios.		
PbO	56.02	55.84	55.93	.2508	.4718	4.02
CuO	1.16	1.13	1.15	.0145		
FeO	0.70	0.70	0.70	.0097		
ZnO	15.96	15.91	15.94	.1968		
V_2O_5	....	20.80	20.80	.1140	.1173	1.00
As_2O_5	0.32	....	0.32	.0014		
P_2O_5	0.27	....	0.27	.0019		
H_2O	4.37	4.36	4.37	.2428	......	2.07
SiO_2	0.20	0.16	0.18			
CaO	0.10	....	0.10			
MgO	0.06	....	0.06			
			99.82			

From I 27.62 per cent of gangue insoluble in cold dilute nitric acid has been deducted, and from II 22.20 per cent; manganese was present in the gangue in small quantity, apparently as pyrolusite, but it was not dissolved by the acid. The insoluble portion was found also to retain very small quantities of lead and zinc, which were estimated and included in the analysis as probably belonging to the vanadate. The water had to be estimated indirectly by deducting from the total amount of water afforded by the dried mixture of vanadate and gangue that belonged to the latter alone, which was found as follows: The mixture, dried at 100° C., was dissolved in cold dilute nitric acid, and the insoluble matter collected in a Gooch crucible was dried at the same temperature and then ignited. The loss on ignition gave the water in the gangue, there being no ferrous iron in the latter to influence the result. The traces of SiO_2, CaO, and MgO may be neglected as probably derived from the gangue. The water, it will be noticed, is double that required by descloizite, $R_2(OH)VO_4$, but in view of the liability to error inherent in the method of water estimation employed, this is not deemed sufficient cause for separating the mineral from descloizite, although the close agreement of the two water determinations, made as they were on samples containing different proportions of gangue, would indicate the correctness of the formula $2[R_2(OH)VO_4]+H_2O$.

Other specimens have since been received from the above-named persons in which the earthy vanadate was associated sometimes with compact cerussite and galena in process of alteration. A dull reddish substance which constituted a part or even the whole of some lumps contained, besides silica, iron and some antimony in an oxidized condition, but carried little or no vanadium.

Prof. F. A. Genth has already called attention[1] to the occurrence of vanadinite and probably of descloizite in the Bald Mountain mine, Beaverhead County, Mont. His specimens, however, showed the supposed descloizite as a pale brownish crystalline coating on yellow ferruginous quartz, whereas the present mineral shows no evidence of crystalline structure.

2. COMMERCIAL MINE, GEORGETOWN, GRANT COUNTY, N. MEX.

This is one of the most interesting occurrences of descloizite known, because of the extreme brilliancy of coloring of the mineral. The ore bodies in the Commercial mine, as well as in the adjoining MacGregor and Naiad Queen mines, occur in limestone immediately under an overlying slate, and appear to narrow in depth where certain eruptive dikes cut through the lime, as Mr. MacIntosh, foreman of the Commercial mine, informed me. The absence of the superintendents of the several mines and the very brief visit I was forced to make prevented obtaining more certain and detailed information.

In places where the rock is most fractured and crushed the descloizite appears in greatest quantity and finest condition as an incrustation on quartz, often covering large surfaces, and in color varying from yellow through all shades of orange-red to deep reddish brown, the last-named colors predominating. The black color so frequent in descloizite from Lake Valley, N. Mex., caused by a superficial coating or admixture of pyrolusite, is, so far as my observation extended, wanting, hence specimens from Georgetown are likely to be much sought after for their showy appearance. A specimen in one of the banks at Silver City, N. Mex., taken from one of the Georgetown mines, resembled a stalactite in form. It was probably fully three feet in height by six to eight inches or more in diameter, and was deep reddish brown in color.

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[1] *Proc. Am. Phil. Soc.*, 1887, vol. 24, p. 38.

The incrustations are for the greater part distinctly crystalline and are generally made up of aggregates of more or less globular forms of a size ranging from microscopic to a diameter of one or two millimeters. Each of these is composed of a great number of apparently flat crystals, intergrown, and projecting sufficiently from the surface to give brilliant reflections when observed under the lens, and to the naked eye a frosted appearance where the globular growths are largest. The richest reddish brown color is always coincident with this development in size. The globular character changes frequently to acicular. In such cases the incrustation seems to have originally formed on bunches of radiating acicular, almost colorless, vanadinite, which frequently appears thus coating the quartz and running under the descloizite incrustations. Sometimes the vanadinite has entirely disappeared, and then there may be a hollow through the center of the descloizite needle.

The occurrence of vanadate of lead in the MacGregor mine at Georgetown has been noticed by Professor Genth (l. c., p. 38). The specific gravity of the mineral was not determined; the hardness is about 3.5; the color of the powder is orange-yellow. An analysis gave the following results after deducting 11.91 per cent of insoluble matter, almost entirely quartz:

		Molecular ratios.			
PbO	56.01	.2512	.4843	.4788	4.12
CuO	1.05	.0132			
FeO	0.07	.0010			
ZnO	17.73	.2189			
V_2O_5	20.44	.1119	.1178	.1162	1.00
As_2O_5	0.94	.0041			
P_2O_5	0.26	.0018			
H_2O	2.45	.1361	.....	.1361	1.17
Cl	0.04	.0011			
SiO_2	1.01				
CaO	0.04				
MgO	0.03				
	100.07				

The third column of molecular ratios gives those values after allowing for admixed vanadinite calculated on the basis of the chlorine found. A further correction has probably to be made for an admixed soluble hydrous (zinc ?) silicate, which might make the ratio approximate more closely to 4 : 1 : 1.

3. LUCKY CUSS MINE, TOMBSTONE, COCHISE COUNTY, ARIZ.

Mr. W. F. Staunton, superintendent of the Tombstone Mining and Milling Company, and Mr. Frank C. Earle, assayer at Tombstone, kindly placed at my disposal for examination specimens of a vanadium mineral the identity of which had not been established. It was found in the Lucky Cuss mine as an incrustation, sometimes half an inch thick, on quartz, showing more or less botryoidal surfaces of an indefinable dull greenish color. On a fractured surface the color is brown; the luster is resinous; the structure granular, only occasionally diverging fibrous; the hardness 3.5; the specific gravity of sample analyzed containing a little impurity, 5.88 at 19° C.; color of powder lemon-yellow. Analysis gave the following results after deducting 0.67 per cent of insoluble matter:

		Molecular ratios.			
PbO	57.00	.2556	.4485	.4385	3.93
CuO	11.21	.1412			
FeO	Trace.	......			
ZnO	4.19	.0517			
V_2O_5	19.79	.1084	.1145	.1115	1.00
As_2O_5	1.10	.0048			
P_2O_5	0.19	.0013			
H_2O	2.50	.1389	.....	.1389	1.25
Cl	0.07	.0020			
SiO_2	0.80				
CaO	1.01				
MgO	0.04				
K_2O	0.10				
Na_2O	0.17				
CO_2	0.82				
	98.99				

The low total is probably owing to a loss of zinc during analysis. Calcite was present as an impurity, and as the CO_2 just suffices for the CaO and MgO these are rejected in considering the composition of the vanadate. The figures in the third column of molecular ratios are found by allowing for probably admixed vanadinite calculated from the chlorine found. In another specimen a qualitative test for chlorine indicated a greater admixture of vanadinite. As in the case of the descloizite from Georgetown, N. Mex., previously described, a further allowance has perhaps to be made for a soluble hydrous silicate. There can be no doubt that the general formula for the vanadate is that of descloizite.

In almost every respect this mineral resembles, so far as the published descriptions allow of judging, the descloizite of Penfield,[1] the cuprodescloizite of Rammelsberg,[2] and the ramirite of de Leon,[3] perhaps also the tritochorite of Frenzel,[4] to the similarity of which with his variety of descloizite Penfield draws attention in his paper. Professor Genth's surmise (l. c., p. 39) of the specific identity of all these substances seems highly probable. Characteristic of the present variety is the greater replacement of the lead-zinc vanadate—true descloizite—by the isomorphous lead-copper vanadate and the lessened tendency toward a fibrous structure, which in the other varieties described seems to be a decidedly pronounced feature. Possibly this last characteristic of the Tombstone mineral, if it be not accidental in view of the few specimens (three) examined, is a condition of the first.

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[1] Am. Jour. Sci. (3), vol. 26, p. 361.

[2] Monatsb. Berl. Acad., 1883, p. 1215.

[3] La Ramirita, nueva espécie mineral, Mexico, 1885.

[4] *Tschermak's Min.* and Petr. Mitth., vol. 3, p. 506, 1880, vol. 4, p. 97, 1881.

According to Rammelsberg,[1] the lead-copper vanadate corresponding to the lead-zinc vanadate (descloizite) is mottramite or psittacinite, though it seems not improbable that it may be the chileite of Dana's Mineralogy. Domeyko's analyses,[2] which led Kenngott to ascribe the above name to the Chilian mineral, show a deficiency of 2.5 and 2.8 per cent, which may very well be V_2O_5. At all events, a recalculation of his analyses based on this assumption leads to a proportion for $PbO+CuO : V_2O_5 : H_2O$ of nearly 4 : 1 : 1.

In view of the well defined character of all these highly cupriferous varieties of descloizite it would be well to designate them once for all by some distinctive name. Tritochorite would have precedence if the substance to which that name has been given is really identical with the others, but Rammelsberg's cupro-descloizite is more appropriate as indicating at once the relationship to descloizite, and I would suggest that it be henceforth used for all cupriferous descloizites showing the physical characteristics of the mineral above described.

NOTE.—Since the foregoing was written there has appeared in the Bull. Soc. Franc. Min., Feb., 1889, p. 38, a paper by F. Pisani, in which he gives another analysis of the Mexican cupro-descloizite and discusses briefly the relations of various vanadates. The essential identity of all the above-enumerated cupriferous lead-zinc vanadates, with the addition of another—schaffnerite, concerning which I have been unable to find any further reference in mineralogical literature—is therein upheld, and the suggestion of Penfield regarding the possible identity of tritoshorite and cupro-descloizite is confirmed by Frenzel himself, who is quoted as writing to Professor DesCloizeaux that he had not thought it necessary to consider as an essential constituent the two per cent of water which he had found in tritochorite.

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[1] Chemische Natur der Mineralien, p. 32.

[2] Ann. d. Mines, IV, vol. 14, 1848, p. 150; Phil. Mag., III, vol. 34, 1849, p. 395.

A NEW METEORITE FROM MEXICO.

BY J. EDWARD WHITFIELD.

While in Mexico during the summer of 1888, Prof. H. A. Ward, of Ward and Howell, Rochester, N. Y., obtained an undescribed mass of meteoric iron weighing 33.0 kilos.

The meteorite was found on a peak of the Sierra de San Francisco, called La Bella Roca, in front of Santiago Papasquiaro, in the State of Durango. The date of its discovery and the name of the finder are unknown.

The composition of the metallic portion does not differ materially from that of other meteoric irons, as the following analysis will show:

Fe	91.48
Ni	7.92
Co	0.22
P	0.21
S	0.21
C	0.06
	100.10

A feature of the meteorite is the presence of large, deep pittings on one side; these are a little greater in diameter just below than immediately at the surface and each one has a little substance left at the bottom, which evidently is the remains of what originally filled the cavities. I succeeded in breaking from the bottom of one pitting material sufficient to determine its nature. It proved to be troilite as the analysis will show:

NiS 2.13, FeS 85.27, Fe 9.37.

The exposed surface of the troilite was greatly decomposed; this portion gave by analysis the following figures:

NiS 2.07, FeS 37.51, Fe_2O_3 37.80. Moisture, 19.85.

This decomposition gives grounds for the idea that the deep pittings were formed by the removal of troilite nodules, partly while the mass was hot and partly by the subsequent weathering.

There are nodules of troilite throughout the entire mass of the meteorite, but none are removed so as to form pittings, on any other part of the surface but the side which is supposed to have been forward.

The mass is deeply furrowed and all the furrows tend away from the side containing the pittings.

Slices of the meteorite, when etched, show rather coarse Widmanstättian figures and also dark diagonal bands of troilite.

From the locality in which this meteorite was found it is but proper that it should be called "La Bella Roca."

I am indebted to Messrs. Ward and Howell for the material for examination and the privilege of description.

DUMORTIERITE FROM HARLEM, N. Y., AND CLIP, ARIZ.

BY J. S. DILLER AND J. E. WHITFIELD.

In 1887 Dr. R. B. Riggs published a description, including a chemical analysis, of "the so-called Harlem indicolite," which was regarded as probably a new boro-silicate. The notice led to correspondence with Prof. E. S. Dana, who identified the mineral as dumortierite, and kindly sent us some of the original dumortierite from near Lyons, France, for comparison.

The physical properties of the Harlem dumortierite agree very closely with those mentioned by Bertrand,[1] Gonnard,[2] and Damour.[3] Crystals are very rare. An imperfect one[4] has been observed with $a(\infty\bar{P}\infty)$ and $m(\infty P)$ equally developed. Both planes are striated parallel to the vertical axis. Indistinct reflections allowed only approximate measurement $am=152°$, and therefore $mm=124°$. Obtuse terminal planes rarely observed on embedded crystals.

Cleavage parallel to a is distinctly developed so that when the mineral is crushed and examined under a microscope cleavage plates may be found which show an obtuse bisectrix lying parallel to $b(\infty\breve{P}\infty)$. Cross fractures occasionally yield basal sections which may be made to exhibit an acute bisectrix. Extinction always takes place parallel to the vertical axis and the mineral is evidently rhombic.[5] In cross-sections imperfect cleavage is rarely seen parallel to some prismatic plane. Polysynthetic twinning is very common parallel to b as well as to other planes in the prism zone. Liquid inclusions and long tubular cavities parallel to the vertical axis are abundant. Hardness $=7$ and specific gravity slightly above 3.265.

The rock in which the dumortierite occurs at Harlem is the pegmatoid portion of a biotite gneiss. These coarse vein-like parts are composed of quartz with both red and colorless orthoclase, some plagioclase and tourmaline. The other portions of the rock contain much biotite and garnet. The fibers of dumortierite are sparingly scattered through the quartz in the coarse granular rock. A few were observed penetrating plagioclase. The thin, thread-like fibers are occasionally so small as not to be distinctly dichroic, but they are intermingled and connected with larger dichroic fibers by every intermediate gradation in size, so that an observer at once regards them all as the same mineral. They sometimes closely resemble the trichitic forms in granitic quartz, which Dr, G. W. Hawes[1] and many others following his suggestion regarded as rutile.

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[1] Bull. Soc. Min. d. France, vol. 3, 1880, p. 171, and vol. 4, 1881, p. 9.

[2] Bull. Soc. Min. d. France, vol. 3, 1881, p. 2.

[3] Bull. Soc. Min. d. France, vol. 4, 1881, p. 6.

[4] It was kindly loaned to us by Mr. R. T. Chamberlin, of New York. Our thanks are also due to Mr. George F. Kunz for the material he so generously furnished for this investigation. It was collected along Fourth avenue at One hundred and twentieth and One hundred and twenty-second streets, as well as near Fort George, a new locality of the same district.

[5] My observations, noted in Mr. Riggs's paper, already referred to, were very hastily made with imperfect apparatus, and published before I had an opportunity for their revision.—*J. S. DILLER.*

The presence of tourmaline in the rock at Harlem was not at first recognized. It is so intimately associated with the dumortierite that they can not be easily separated. Their pleochroic phenomena, however, are so unlike that they can be readily distinguished under a polarizing microscope. The presence of tourmaline renders the results of Mr. Riggs's analysis less trustworthy. By means of the Klein solution and an electro-magnet the tourmaline was separated from the dumortierite. The .217 gram of the latter thus obtained was analyzed with the following result.[2] Only the smallest trace of B_2O_3 was observed.

SiO_2 31.44 Al_2O_3 68.91

Fortunately, at the time it became particularly desirable to obtain a larger quantity of dumortierite for analysis a collection of minerals was sent by Mrs. C. A. Bidwell from Clip, Yuma County, Arizona, to the National Museum for identification. Among them Prof. F. W. Clarke noticed a blue mineral, which proved to be dumortierite. It is finely fibrous and so abundant as to give color to the rock, which is composed chiefly of granular quartz. A few grains of magnetite and limonite are the only other minerals intermingled with the quartz and dumortierite, so that it seems an easy matter by means of a heavy solution and an electro-magnet to obtain the latter mineral for chemical analysis. The results are given under I, below.

These figures appear to show the material analyzed to be impure, and it was thought advisable to obtain more of the rock and endeavor to separate the dumortierite as far as practicable from all impurities. Mrs. C. A. Bidwell kindly furnished a sufficient amount of much better material, in which the only mineral associated with the dumortierite was quartz. As dumortierite is not acted upon by hydrofluoric acid; the rock, after being crushed to small particles, was digested in this acid for a length of time sufficient to decompose most of the quartz. The mass was then washed with water, dried, and any quartz that might still remain separated by Thoulet's solution. After thorough washing the material was examined with the aid of a microscope and found to be free from gangue. Having been ground exceedingly fine and dried at 104° C. for about three hours, the mineral was analyzed with the following results (II):

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[1] *Mineralogy* and Lithology of N. H., 1878, p. 45.

[2] The chemical work for this paper was done by Mr. Whitfield.

	I.	II.
Si_2O_2............	31.52	27.99
Al_2O_3...........	63.66	64.49
CaO	trace.	....
MgO............	.52	trace.
Na_2O	.37	....
K_2O	.11	....
B_2O_3............	2.62	4.95–4.93
P_2O_5		0.20
Ignition	1.34	H_2O 1.72
	100.14	99.35

Analysis II shows less impurity than the first specimen analyzed. These results indicate either that dumortierite is not a simple silicate of aluminum as stated by Damour;[1] or else that the material analyzed was a mixture of dumortierite with some other compound.

If we assume the formula of Damour to be correct and estimate all the SiO_2 in the analysis as belonging to the formula $Al_8Si_3O_{18}$, then there will be left unaccounted for a small amount of Al_2O_3, H_2O, and B_2O_3, and these are present in the proportions represented by the formula $AlB_3O_6 . 2H_2O$. If this mode of interpretation be correct, then the mineral from Arizona corresponds approximately to the formula $3Al_8Si_3O_{18} . AlB_3O_6 . 2H_2O$ which requires $Al_2O_3=65.2$ per cent; $SiO_2=27.6$ per cent; $B_2O_3=5.4$ per cent; $H_2O=1.8$ per cent, agreeing quite closely with the actual analysis. A borate of aluminum corresponding to the above formula is, we believe, not actually known, and concerning its properties nothing can be predicted. If it exists it is certainly remarkable that it should withstand the treatment with hydrofluoric acid which the dumortierite received during the process of purification.

We are greatly indebted to Mrs. C. A. Bidwell for the supply of material for investigation, which at the cost of much personal labor she so liberally furnished.

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[1] Bull. Soc. Min. de France, vol. 4, p. 6.

CHEMICAL ACTION BETWEEN SOLIDS.[1]

By William Hallock.

In a note on a new method of forming alloys published some time ago,[2] I suggested some additional experiments which I intended to make, and I now give the results thus far obtained. Unfortunately, other work prevents my continuing the investigation at present.

Inasmuch as the method and principle[3] seemed well established where metals were used to produce alloys, an attempt was made to include some chemical reactions in the list. The most natural cases were the freezing mixtures where solid reagents are used. In order to surely have both constituents in a decidedly solid state the experiments were performed in a vessel cooled to a temperature of minus 10° or 12° C., care being always taken to leave the reagents in the vessel long enough for them to assume a temperature decidedly below zero Centigrade. Under these conditions a crystal of rock salt (NaCl) and a piece of clean, dry ice were gently brought in contact, lying side by side on a watch glass. Of course the result was the solution of salt, but old as this experiment may be, it appears here in a new connection, as an example of the union of two solids below the melting point of either, but above that of the product. The piece of ice was frozen to the glass and during the operation the crystal was drawn several millimeters across the glass, doubtless by capillarity, as the solution ran out at the bottom of the surface of contact as fast as it formed, the attraction being sufficient to move a crystal several grams in weight.

Similar experiments were performed with sodium and potassium, nitrate potassium, calcium and ammonium chloride, and sodium and potassium hydrate, with a similar result in all cases. These are all well known results, but wherein do they differ from the new method of forming alloys? This question suggests another. Are the metals combining to form an alloy in the new way a freezing mixture? A thorough investigation of the question would require more complicated experiments than I had time to perform. One test, however, is very simple, that with potassium and sodium.

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[1] This paper was read in part before the Phil. Soc. of Washington, D. C., October 13, 1888, and appeared in full in the Am. Jour. Sci., vol. 37, 1889, p. 402.

[2] W. Hallock, Zeitschr. f. Phys. Chem., vol. 2, 1888, p. 6. Science, vol. 11, 1888, p. 265.

[3] O. Lehmann, Wiedemann Ann., vol. 24, 1885, p. 5, suggested the theoretical possibility of producing an alloy in this way. I had overlooked his paper until recently. Mr. Lehmann, however, evidently did not consider it possible to fulfill the necessary conditions and did not try the experiment.

Into a small porcelain crucible weighing 15 grams and containing about an equal weight of petroleum were placed pieces of the two metals, about 3 grams of each. One junction of a thermo-element was forced into the piece of potassium and gave its temperature accurately. After the whole had assumed the room temperature, clean faces of the two metals were brought into contact, the liquefaction began, and *the temperature immediately fell.* It required about two hours to complete the liquefaction and about one and a half hours to attain the minimum of temperature. No precautions were taken to prevent the calorimeter taking up heat from its surroundings, and, no doubt, it absorbed considerable in the long time, and yet the maximum fall in temperature amounted to 2.4° C., very large, considering the small weight of the reagents compared with the calorimeter. Thus it appears that sodium and potassium are, under such circumstances, a "freezing mixture," and analogy at least would lead one to believe that other alloys also absorb heat in their formation; but future experiment must decide the point.

In the cool vessel above described a piece of sodium or potassium was placed upon a piece of dry ice; almost instantly the reaction commenced and proceeded vigorously. It is, however, scarcely safe to consider this a case of chemical action between solids, because the reaction is probably as follows: The vapor from the ice attacks the metal, forming the hydrate which unites with other ice, forming a solution, which is then further acted upon by the metal, and in the whole process heat is generated sufficient to raise the temperature of the reagents very considerably. Perhaps in the other freezing mixtures, ice and salt, etc., it is the vapor of the water or ice which initiates the reaction.

In view of these and other considerations, the idea is evident that perhaps many substances have a slight vapor tension at temperatures considerably below their melting points, and are surrounded by a thin atmosphere of their own vapor over their clean surfaces, and it is only necessary to bring two such atmospheres to interpenetration in order to initiate the reaction which will then continue, provided the product (liquid or gas) escapes easily and does not clog the operation. In very many cases substances are found to give off a vapor below their melting point, and it is natural to suppose that there is a film of that vapor over the surface of the body, as there is a layer of saturated air over water. The mechanical theory of the composition of matter lends plausibility to the above suggestion. If these considerations are correct they foretell the regelation of substances like camphor and ice, without any pressure whatever. That loose pieces of camphor will become welded together by simple contact is well known. The operation appears to me thus: In an irregular mass of camphor in an atmosphere of camphor vapor, there is a constant interchange of state for the molecules at the surfaces of the solid, molecules previously solid are getting too far off and becoming gas, and molecules previously gas are beating upon the solid and staying there; thus the state of equilibrum is when, as a whole, there are as many molecules which fly off and become gas as fly on and become solid. On a projecting point of the solid the chances are in favor of more flying off than on; in a reentrant angle the reverse is true. Theoretically, then, the piece ought ultimately to become a sphere, not only by the rounding down of the corners, but by the building up of the flat or reentrant sides. That the corners do round off all know. If this is all true we only need to bring the two pieces together and consider them as one, and the crack between them as a reentrant angle, and the union is brought about as above indicated. If in the above the word liquid be substituted for vapor or gas, the explanation will apply to the regelation of ice in water at 0° C.

We may go even further and predict a uniting without actual contact, and this prediction has been experimentally demonstrated in the case of ice and water. A large rough block of ice (about 15 pounds) was sawed nearly in two, the slit washed out and all the fine pieces removed. In this way it was possible to hold two plane surfaces of ice parallel and near each other (1 to 2^{mm}) without danger of actual contact. Into the outer edge of the saw-cut a cotton wick was pressed, thus isolating the space between the faces from the outside and preventing any currents from circulating through the crack. The whole block was then placed in water at zero and inclosed in non-conducting cases and left for twenty-five to thirty hours. This experiment was tried three times and each time a freezing across the space had taken place. The whole space was not filled, but in numerous places, notably along just inside the wicking and up from the bottom of the cut. No doubt the regelation would have gone further if the experiment could have been continued longer. The melting of the whole block puts an end to each experiment. As these experiments were performed in summer there is scarcely a possibility that the ice was colder than 0° C.

Inasmuch as there appears to be an increasing inclination to regard solutions and alloys as chemical compounds, it seems justifiable to speak of the action according to the alloy law as chemical. On the other hand, there are some cases which at first appear as chemical action between solids which upon closer investigation can be explained on a simpler assumption.

For example, Mr. W. Spring,[1] in a recent paper on this subject, cites three particular cases as being chemical action between solids, the union of copper and sulphur, the reaction between copper and mercuric chloride, and between potassium nitrate and sodium acetate.

The formation of the sulphide of copper and other sulphides was accomplished by Mr. Spring by compression of the elements. But it is not even necessary that the sulphur and copper be in contact. I have made the sulphide at ordinary temperatures with the two an inch apart and a wad of cotton in the tube between them. It is simply the *vapor* of sulphur which attacks the copper. That sulphur gives off a perceptible vapor at ordinary temperatures, especially in vacuo, is a fact any one can easily demonstrate. The case of the copper and mercuric chloride is precisely the same. The *vapor* of the chloride will go through a whole tube past cotton wads and attack the copper, or color potassic iodide. Hence we can scarcely assert that these reactions are between *solid* bodies. The reaction between potassium nitrate and sodium acetate is equally unconvincing. Mr. Spring expected an interchange of bases and acids and left the mixture of the dry fine powders four months in a desiccator to give time for the exchange. On removing them from the desiccator a deliquescence was noticeable and he therefore concludes that the interchange had taken place, since the original salts do not easily deliquesce; but the product of the reaction (potassium acetate) does. It appears to me thus: The moment the powders were brought to the air, the water vapor enters the operation and we have potassium nitrate, water vapor, and sodium acetate, and the result of their mutual interaction is a solution of potassium acetate and sodium nitrate. In fact, if the dry powdered salts are stirred together, in a very few moments deliquescence begins, showing that whatever the reaction it goes on at once, and is a matter of moments and not of months. Thus even this experiment in its present form does not convince us that a chemical exchange took place *before* the water vapor entered the reaction.

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[1] W. Spring, Zeitschr, für phys. Chemie, vol. 2, 1888, p. 536.

The question of chemical action between solids is by no means new, but is being constantly extended. I may say I believe chemical action may take place wherever the product or products are liquid or gaseous even though the reagents are solid, with perhaps the added condition that one or both the reagents be soluble in the liquid produced. If this be true my new method of forming alloys is but a special case of the above general principle.[1]

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[1] Experiments endeavoring to produce carbon disulphide from the elements at ordinary temperatures, are in hand and give promise of positive results. Also, experiments on the interaction of potassium nitrate and sodium acetate have been started; it will, however, be some time before further results can be given.

THE FLOW OF SOLIDS: A NOTE.

BY WILLIAM HALLOCK.

The American Journal of Science, vol. 34, 1887, p. 277, contained an abstract of my paper under the above title, which appears in full in Bulletin 55 of the U. S. Geological Survey. The results obtained were so different from those of Mr. Spring that I was led to a criticism of his work and seem to have been misunderstood.[1]

The justice of Mr. Spring's[2] protest against a part of my original paper I am glad to admit, as far as it concerns an ill-advised use of terms, and a consequent misrepresentation of his views, of course entirely unintentional. Not realizing that many were not so familiar with Mr. Spring's works as myself, I neglected in the brief paper to give his views, and thus my deductions from his results seemed to represent his own conclusions.

The object of my original investigation[3] was a solution of the question whether pressure alone is capable of producing true liquefaction; many have certainly believed so, or even do believe so, and a few, at least, including myself, saw in Mr. Spring's earlier results evidence of such a possibility. I believe that to produce such phenomena, as some recrystallizations, and diffusion, an increase in the freedom of motion of the molecule, an increased diffusibility, *i. e.*, the beginning of a liquefaction, is indispensable. Hence I looked upon his results as pointing to a liquefaction by pressure. My own experiments with the same substances and pressures showed the impossibility of liquefying them by pressure and even brought out an enormous increase in the rigidity of bees-wax and paraffin[4] under such pressures. In concluding I wished only to call attention to the difference between Mr. Spring's *results* and my own, but unfortunately a loose and abbreviated quotation caused the misunderstanding, which I wish to explain.

Since obtaining my own results there seems to me little doubt that many, at least, of Mr. Spring's effects are caused rather by a *motion*

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[1] The following appeared in Am. Jour. Sci., vol. 36, 1888, p. 60.

[2] W. Spring, Am. Jour. Sci., vol. 35, 1888, p. 78, also Bull. de l'Acad. R. Belg., vol. 14, 1887, p. 585.

[3] W. Hallock, Am. Jour. Sci., vol. 34, 1887, p. 277.

[4] *Compare* also Ordnance Department Tests of Metals, etc., 1884, Government Print*ing Office, pp.* 252-254, 285-287.

under pressure, a kneading, as it were, and by the regrinding. The holders in which his compressions were made were not tight and the most perfect welding[1] always took place at the surface of the block, or the corners, or where the material was forced into the cracks, often even while the center, under equal pressure, remained almost unaffected. My holders were tight, allowing no leaking or motion, and the substances showed scarcely a trace of a welding under pressure. I must therefore reiterate that which I wished originally to impress, namely, that the majority of Mr. Spring's results are not produced by simple cubic static pressure.

In the cases of chemical action and the formation of alloys, I believe that the *motion under pressure* will be found to be the all important factor, perhaps just as stirring assists diffusion to completely mix two liquids. Even if blocks of barium sulphate and of sodium carbonate[2] were brought into actual chemical contact, I think no one would expect that simple diffusion would complete the interchange of bases and acids in finite time so long as both substances remained solid; nor that a piece of copper and of tin soldered together would diffuse and form a homogeneous bronze; nor would they expect that simple cubic static pressure would promote these reactions; if pressure will assist them to completion, it will increase the diffusibility of solids, increase the freedom of motion of their molecules; that is, it will make them more like liquids—will begin to liquefy them.

I wish to refer here to a new law I recently proposed[3] concerning the formation of alloys, where the fact is brought out that the melting point and liquidity of the product are quite as important as those of the constituents in determining the possibility of a reaction. Mr. Spring[4] has produced Wood's alloy by compressing the constituents together, and quotes Mr. Romna[5] as having failed to obtain fine platinum wire by electro silver-plating a platinum wire, drawing it down and dissolving off the silver in nitric acid, because the silver and platinum alloyed under the pressure of the draw plate. Messrs. W. & L. E. Gurley, of Troy, N. Y., have for several years made fine platinum wires by the well-known Wollaston[6] method of *casting* silver around the platinum and treating as above. In the note referred to[4] I have described the production of Wood's alloy *without pressure at* 100° C. of a tin-lead alloy at 190° C. of the sodium-potassium alloy at ordinary temperatures, etc. Hence it appears to me that pressure alone is the least important factor in the production of the effects obtained in Mr. Spring's investigation.

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[1] W. Spring, Bull. d. l'Acad. R. Belg., vol. 49, 1880, p. 352. Phosphore amorphe et seq.

[2] W. Spring, Bull. Soc. Chem., vol. 44, 1885, p. 166.

[3] W. Hallock, Science, Mar. 2, 1888, vol. 11, p. 100; also Ostwald Zeitschr. f. Phys. Chem., vol. 2, 1888.

[4] W. Spring, Ber. der deutsch. Chem. Gesell., vol. 15, 1882, p. 595.

[5] Ibid.

[6] Ganot's Physics, Atkinson, New York, 1883, p. 76.

MISCELLANEOUS ANALYSES.

1. TYROLITE.[1]

From the Mammoth Mine, Tintic district, Utah. New material, very pure, collected and analyzed by W. F. Hillebrand.

CuO	45.08
FeO	.08
CaO	6.78
MgO	.04
H_2O	17.21
As_2O_5	28.52
SO_3	2.23
Insoluble	.16
	100.10

2. GADOLINITE.

From Llano County, Texas. Analyzed by L. G. Eakins.[2]

SiO_2	23.79
ThO_2	.58
Fe_2O_3	.96
Ce_2O_3	2.62
$(DiLa)_2O_3$	5.22
$(YEr)_2O_3$	41.55
FeO	12.42
GlO	11.33
MnO	trace
CaO	.74
MgO	trace
Alkalies	trace
H_2O	1.03
P_2O_5	.05
	100.29

In the rare earths from this mineral the absorption spectrum of didymium was strong, and that of erbium was weak. The molecular weight of the oxide $(YEr)_2O_3$ was 260.

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[1] Compare analyses in Bulletin 55, p. 41.

[2] *Compare* Hidden & Mackintosh, Am. Jour. Sci., Dec., 1889.

3. WARWICKITE.

From the well-known locality at Edenville, Orange County, New York. Analyzed by J. E. Whitfield. The material could not be completely freed from an admixture of spinel.

SiO_2	1.16
TiO_2	18.68
FeO	14.23
Al_2O_3	9.44
B_2O_3	18.96
CaO	.38
MgO	34.41
H_2O	2.60
	100.06

From this composition no simple formula can be deduced; but if we reject obvious impurities, and throw out the alumina in the form of spinel, the residue agrees approximately with the ratios

$$TiO_2 \,.\, B_2O_3 \,.\, 4R''O.$$

This expression is not quite satisfactory, and may need revision.

4. MINERALS AND ROCKS FROM MARYLAND.

Collected by Dr. G. H. Williams.

Chrome tourmaline and fuchsite.—Found in chrome pits a mile west of Etchison post-office, a little east of Great Seneca Creek, in Montgomery County. The tourmaline occurs in dark-green needles, with chromite, and the mica is associated with it. Analyses by T. M. Chatard.

	Tourmaline.	Fuchsite.
H_2O	3.74	6.77
SiO_2	36.57	42.21
B_2O_3	8.90	
F	.06	
P_2O_5	.04	
TiO_2	.09	
Al_2O_3	32.58	34.55
Cr_2O_3	4.32	2.03
Fe_2O_3, FeO	.79	1.03
NiO	.05	
MnO	trace	trace
CaO	.75	.47
MgO	9.47	3.13
Li_2O	trace	
Na_2O	2.22	.82
K_2O	.13	9.16
	99.71	100.17

These minerals are more fully discussed by G. H. Williams and A. C. Gill in Circular No. 75 of the Johns Hopkins University. In the same paper is described epidote from the Woodstock granite, of which the following analysis has been made by Dr. W. F. Hillebrand, on only 0.4473 gramme of material:

SiO_2	37.63
$Fe_2O_3(+FeO)$	15.29
Al_2O_3	18.40
TiO_2	3.78
MnO	.31
CaO	22.93
MgO	.31
P_2O_5	.44
Ignition	2.23
	101.32

Rocks from Baltimore County.—Analyses by J. E. Whitfield. A, pyroxenite, Johnny Cake Road. B, pyroxenite, Johnny Cake Road, first stage of alteration. C, pyroxenite, Johnny Cake Road, second stage of alteration. D, smaragdite, Dogwood Road.

	A.	B.	C.	D.
SiO_2	50.80	50.10	51.94	53.22
SO_3	trace	trace	.19	trace
Cl	.24	.26	.16	.26
P_2O_5	trace	none	none	....
Al_2O_3	3.40	2.00	2.53	3.14
Cr_2O_3	.32	.36	.60	.23
Fe_2O_3	1.39	2.38	2.88	trace
FeO	8.11	8.68	9.38	7.95
MnO	.17	.29	trace	.11
CaO	12.31	5.06	3.60	14.44
MgO	22.77	26.85	25.97	20.09
Alkalies	traces	none	none	traces
H_2O	.52	4.16	2.82	.98
	100.03	100.14	100.07	100.42

Titanium was absent from all four.

Another pyroxenite (E), and a diallage-bronzite rock (F), from the same region, were analyzed by T. M. Chatard.

	E.	F.
SiO_2	43.87	53.98
TiO_2	.12	.15
P_2O_5	trace	trace
Al_2O_3	1.64	1.32
Cr_2O_3	.44	.53
Fe_2O_3	8.94	1.41
FeO	2.60	3.90
MnO	.19	.21
NiO	trace	trace
CaO	6.29	15.47
MgO	27.32	22.59
Alkalies (AsNa_2O)	.50	undet.
H_2O	8.72	.92
	100.63	100.48

5. SERPENTINE AND ITS ASSOCIATES.

From Moriah, New York.—Derived from pyroxene. Four analyses by Charles Catlett, as follows: A, serpentine from the ophiolite of Reed's Quarry. B, "dolomite" from the same rock. C, pyroxene from an abandoned quarry. D, serpentine derived from the same pyroxene.

	A.	B.	C.	D.
SiO_2	39.96	2.60	55.36	42.17
Al_2O_3	1.07	.09	.22	.30
Fe_2O_3	3.53	none	.18	1.57
FeO	3.85	.80	.57	.64
MgO	37.61	2.49	19.53	41.33
CaO	none	52.38	24.48	none
CO_2	none	41.77	....	none
MnO	trace	.04	trace	trace
H_2O	13.65	....	....	13.72
	99.67	100.17	100.34	99.73

Chromium and nickel sought for, but absent.

Serpentine from the aqueduct shaft, New York City.—Analyzed by Mr. Catlett:

SiO_2	39.92
Al_2O_3	.08
Fe_2O_3	.50
FeO	none
MgO	42.52
CO_2	1.64
CaO	.90
H_2O at 105°	1.36
Ignition	13.26
	100.18

From Montville, New Jersey.—A, very pale serpentine, somewhat resembling deweylite in appearance. B, mineral, resembling actinolite. C, brown mica, first zone above pyroxene. D, yellowish mica, second zone above the pyroxene. E, white mica, associated with pyroxene. Analyses A and B, by L. G. Eakins; C, D, and E, by Charles Catlett. In D and E the ferrous oxide was not separately estimated for want of sufficient material.

	A.	B.	C.	D.	E.
H_2O	14.73	1.17	5.07	10.88	10.20
CO_2			.30	1.80	
SiO_2	40.64	43.31	39.38	32.52	39.14
Al_2O_3	2.74	17.41	15.92	18.14	15.70
Fe_2O_3	.81	.71	.71	2.30	1.68
FeO	.28	.59	.80		
MnO	trace	.14	trace	trace	trace
CaO	trace	12.84	.28	1.44	5.24
MgO	40.93	19.39	26.85	29.26	25.44
Na_2O		2.23	.62	1.38	.64
K_2O		1.36	9.84	2.78	2.06
F			.62		
	100.13	99.15	100.39	100.50	100.10
Less O			.26		
			100.13		

Associates of serpentine from Easton, Pennsylvania.—A, vermiculite, analyzed by C. Catlett; B, tremolite; C, so-called "nephrite." Analyses B and C by L. G. Eakins.

	A.	B.	C.
SiO_2	42.21	58.27	60.29
Al_2O_3	9.37	.33	20.83
Fe_2O_3	.68	trace	trace
FeO	none		
MnO	none	.08	
CaO	none	11.90	.16
MgO	34.80	25.93	6.44
Na_2O	1.25	1.25	1.97
K_2O	1.34	.42	8.41
H_2O	10.70	1.22	1.13
	100.35	99.40	99.23

All of the foregoing minerals were collected by Mr. G. P. Merrill.

6. GEYSERITES FROM ROTORUA, NEW ZEALAND.

Received from the museum at Auckland. Analyzed by J. E. Whitfield for comparison with the geyserites of the Yellowstone Park, which they closely resemble. Three samples:

	1.	2.	3.
SiO_2	92.47	90.28	74.63
Al_2O_3	2.54	3.00	15.59
CaO	.79	.44	1.00
MgO	.15	trace	trace
Na_2O			.30
K_2O			1.02
Ignition	3.99	6.24	7.43
	99.94	99.96	99.97

7. MISCELLANEOUS ROCKS.

Sandstone from Buena Vista, Ohio.—A yellowish building stone. Partial analysis by F. W. Clarke.

Moisture	2.51
SiO_2	88.27
$Al_2O_3+Fe_2O_3$	9.09
MgO	trace
	99.87
Insoluble in HCl	96.47
Soluble Fe_2O_3	.77

Sandstone from near Portsmouth, Ohio.—The "Peebles-Henley" or "Otway" building stone. Three samples, analyzed by T. M. Chatard. In B and C the iron was mainly ferrous, though weighed as Fe_2O_3.

	A.	B.	C.
Ignition	1.08	1.46	1.95
Insoluble in HCl	98.31	97.20	95.83
Soluble	.61	1.40	2.42
	100.00	100.06	100.20
Soluble Fe_2O_3	.61	1.04	1.65
Soluble CaO	trace	.36	.77
Soluble MgO	trace	little	trace

Limestone from Silverdale, Kansas.—Analyzed by Charles Catlett.

SiO_2	5.27
Al_2O_3	1.07
Fe_2O_3	.71
FeO	.32
CaO	50.36
MgO	.56
Na_2O	.20
K_2O	.10
CO_2	40.34
SO_3	.07
P_2O_5	.06
H_2O	.78
	99.84

Metamorphic rock from Marion, Kentucky.—Analyzed by L. G. Eakins.

SiO_2	34.50
Al_2O_3	14.37
Fe_2O_3	2.85
FeO	4.46
CaO	11.43
MgO	21.81
K_2O	1.50
Na_2O	.51
H_2O	7.14
P_2O_5	.77
SO_3	.60
CO_2	.21
	100.15

From Pigeon Point, Michigan.—Analyses by L. G. Eakins. A, red porphyry from Brick Island, Lake Superior, near Pigeon Point. B, green mottlings from Pigeon Point. Van Hise's rock, No. 11908.

	A.	B.
SiO_2	73.70	83.27
TiO_2	.12	trace
Al_2O_3	12.87	7.81
Fe_2O_3	3.76	1.99
FeO	.31	1.81
MnO	.07	....
CaO	.14	.20
MgO	.11	1.59
K_2O	4.56	1.11
Na_2O	3.63	.19
H_2O	.57	2.32
P_2O_5	trace	trace
	99.84	100.29

Diabase, Penokee-Gogebic Range, Michigan.—Analyses by T. M. Chatard. A, from near SE. corner of Sec. 13, T. 47 N., R. 46 W. B, altered diabase, same locality. C, altered diabase, Aurora Mine, NE. ¼ of SW. ¼ Sec., T. 47 N., R. 47 W. D, feldspar separated from A.

	A.	B.	C.	D.
H_2O, at 105°	.15	3.12	.29	1.19
H_2O, at red heat	2.34	8.25	13.54	
CO_2	.38	1.89	.38	1.89
P_2O_5	.13	.16	.14	....
SiO_2	47.90	46.85	41.60	51.18
TiO_2	.82	1.12	3.79	....
Al_2O_3	15.60	22.62	37.20	27.00
Fe_2O_3	3.69	5.12	3.21	3.19
Cr_2O_3	trace	....	....	....
FeO	8.41	1.58	.30	undet.
NiO	.10	.08	....	....
MnO	.17	2.54	.08	.17
BaO	.05	.10	trace	....
CaO	9.99	1.25	.23	11.70
MgO	8.11	2.01	.02	1.92
K_2O	.23	2.66	....	.41
Na_2O	2.05	.80	.07	3.48
	100.12	100.15	100.85	100.24

Penokee-Gogebic rocks from Wisconsin.—A, B, C, three slates, analyzed by L. G. Eakins. A, from Sec. 6, T. 45 N., R. 2 E. B, from Sec. 1, T. 45 N., R. 1 E. C, from Sec. 4, T. 44 N., R. 2 W.

	A.	B.	C.
SiO_2	53.44	59.73	52.58
Al_2O_3	19.62	22.78	20.76
Fe_2O_3	11.38	.11	12.17
FeO	5.35	5.98	4.08
MnO	trace	.09	.21
CaO	.42	.53	.30
MgO	1.58	2.94	1.33
K_2O	1.73	3.48	4.87
Na_2O	2.61	1.41	.37
Li_2O	trace	....	trace
H_2O	4.07	3.28	3.43
P_2O_5	trace	....	....
	100.20	100.33	100.10

D, E, F, three feldspars, analyzed by T. M. Chatard. D, from gabbro, center of Sec. 14, T. 44 N., R. 4 W. E, F, from olivine diabase, NE. ¼ Sec. 13, T. 45 N., R. 1 W.

	D.	E.	F.
H_2O, at 105°	.03	.95	.13
H_2O, at red heat	.54		.64
SiO_2	51.99	61.65	56.15
Al_2O_3	29.32	19.91	26.05
Fe_2O_3	1.23	2.28	1.98
FeO	undet.	undet.	undet.
MnO	trace	trace	.13
CaO	12.60	4.12	8.70
MgO	.63	.61	.54
K_2O	.28	5.72	1.56
Na_2O	2.91	4.74	4.79
	99.53	99.98	100.67

Eruptive rock from four miles southwest of Hot Springs, Arkansas.—Analyzed by L. G. Eakins.

SiO_2	36.40
TiO_2	.42
Al_2O_3	12.94
Fe_2O_3	8.27
FeO	4.59
CaO	14.46
MgO	11.44
K_2O	3.01
Na_2O	.97
H_2O	2.36
CO_2	3.94
P_2O_5	1.04
	99.84

Recent lava from two miles south of Mount Trumbull, Arizona.—Analyzed by L. G. Eakins.

SiO_2	45.30
TiO_2	2.66
Al_2O_3	14.95
Fe_2O_3	1.98
FeO	9.32
MnO	trace
CaO	8.87
MgO	8.29
K_2O	1.27
Na_2O	4.27
H_2O	.85
P_2O_5	2.23
	99.99

Eruptive rock from Castle Mountain, Montana.—Analyzed by L. G. Eakins.

SiO_2	44.66
TiO_2	1.02
Al_2O_3	12.12
Fe_2O_3	5.81
FeO	3.20
MnO	.21
CaO	8.14
MgO	8.77
K_2O	2.75
Na_2O	4.47
H_2O	4.33
CO_2	2.19
P_2O_5	2.02
	99.69

Rocks from Northern California.—Collected by J. S. Diller. A, B, porphyritic rocks from Shasta County; analyzed by J. E. Whitfield. A, east fork of Clear Creek, nine miles from French Gulch. B, Smith's Gulch, six miles up Clear Creek from French Gulch.

	A.	B.
SiO_2	66.30	64.24
TiO_2	trace	.76
SO_3	.28	.22
Cl	none	.25
P_2O_5	.15	.08
Al_2O_3	17.55	18.67
Fe_2O_3	2.19	1.40
FeO	.55	1.96
MnO	trace	trace
CaO	3.12	4.11
MgO	.97	1.48
Na_2O	5.15	4.14
K_2O	2.45	1.71
H_2O	1.25	1.18
	99.96	100.20

C, D, two rocks from three-fourths of a mile below John Allen's, D Creek, Shasta County. E, from John Allen's. F, from two and one-ha miles above John Allen's. Analyses by Whitfield.

	C.	D.	E.	F.
SiO_2	59.10	61.60	54.55	60.74
TiO_2	.70	trace	trace	.86
SO_3	trace	.27	.10	.40
Cl	trace	trace	.12	trace
P_2O_5	trace	.08	.10	trace
Al_2O_3	14.02	12.15	10.64	10.25
Fe_2O_3	3.16	2.09	1.59	4.31
FeO	1.42	3.30	1.16	6.21
MnO	trace	trace	1.53	trace
CaO	9.35	6.92	14.30	4.97
MgO	1.72	2.33	1.29	3.69
Na_2O	2.21	2.16	2.60	1.83
K_2O	1.49	1.41	1.68	.52
CO_2	4.65	5.05	9.05	2.29
H_2O	2.63	3.10	1.60	4.36
	100.45	100.46	100.31	100.43

G, eruptive rock, Great Bend of Pit River. H, black obsidian, Med cine Lake, Modoc County; analyses by L. G. Eakins.

	G.	H.
SiO_2	44.77	73.51
TiO_2	.53	....
P_2O_5	.72	.04
Al_2O_3	17.82	14.42
Fe_2O_3	5.05	.46
FeO	6.95	1.49
MnO	trace	trace
CaO	10.36	1.26
MgO	8.22	.33
Na_2O	2.13	4.03
K_2O	.92	4.29
H_2O	2.64	.40
	100.11	100.23

8. SOILS AND CLAYS.

A, kaolin from Talladega, Alabama. B, clay from Richfield Springs, New York; partial analysis. C, D, two clays from Northumberland County, Pennsylvania; analyses by Charles Catlett.

	A.	B.	C.	D.
H_2O, at 120°	5.02	16.18	6.28	6.87
H_2O, at red heat	13.48			
SiO_2	43.21	49.65	65.97	59.16
Al_2O_3	37.27	23.82	20.37	18.68
Fe_2O_3	trace		2.75	10.32
CaO	.11	6.48	.64	.52
MgO	.10	trace	.52	.67
K_2O	.28	undet.	3.32	3.35
Na_2O	.40	undet.	.05	.11
	99.87	96.13	99.90	99.68

E, F, G, H, adobe soils. E, from Santa Fé, New Mexico. F, Fort Wingate, New Mexico. G, Humboldt City, Nevada. H, Salt Lake City, Utah. Analyses by L. G. Eakins.

	E.	F.	G.	H.
SiO_2	66.69	26.67	44.64	19.24
Al_2O_3	14.16	.91	13.19	3.26
Fe_2O_3	4.38	.64	5.12	1.09
MnO	.09	trace	.13	trace
CaO	2.49	36.40	13.91	38.94
MgO	1.28	.51	2.96	2.75
K_2O	1.21	trace	1.71	trace
Na_2O	.67	trace	.59	trace
CO_2	.77	25.84	8.55	29.57
P_2O_5	.29	.75	.94	.23
SO_3	.41	.82	.64	.53
Cl	.34	.07	.14	.11
H_2O	4.94	2.26	3.89	1.67
Organic matter	2.00	5.10	3.43	2.96
	99.72	99.97	99.84	100.35

9. ORES OF IRON AND MANGANESE.

Manganese ore, Powell's Fort, east end of Massanutten Mountain. Warren County, Virginia. Analysis by Charles Catlett.

SiO_2	9.20
Fe	3.07
Mn	48.59
P	.349
S	.12

Iron and manganese ores, Montebello, Nelson County, Virginia. Analyses by Catlett.

	Iron.	Manganese.
SiO_2	16.47	1.68
Fe	51.10	2.60
Mn	.65	46.99
P	.152	.464
S	.11	.21

Ores from Rockbridge County, Virginia; analyzed by T. M. Chatard. A, top of hill above Hart's Bottom, one and three-fourths miles southwest of Green Forest Station, near Lockland Station. B, Moorman Quarry, Green Forest. C, new opening, No. 2, Buena Vista. D, opening, No. 3, 40-foot vein, Buena Vista. E, Chalk Mine Branch. F, Old Colonial opening, Buena Vista.

	A.	B.	C.	D.	E.	F.
H_2O, 105°	.72	.15	.39	.60	.45	.48
Insoluble	20.40	13.47	22.55	16.60	8.05	5.43
Soluble Al_2O_3	1.67	....	.37	1.81	.46	....
TiO_2	.16	....	....	....	....	....
Fe_2O_3	3.11	76.19	66.58	71.16	78.24	82.15
NiO	....	....	.27	....	....	....
MnO	53.91	.45	.22	.11	.66	.19
BaO	.23	....	....	....	....	....
SO_3	.32	.14	.09	.37	trace	.08
P_2O_5	.50	.26	.42	.50	.88	1.04
Fe	2.18	53.33	46.60	49.81	54.76	57.50
Mn	41.59	....	....	....	....	....
P	.22	.11	.18	.22	.38	.45
S	.12	.06	.03	.14	....	.02

Two manganese ores. Cripple Creek, eight miles from Wytheville, Virginia. Analyses by C. Catlett.

	1.	2.
SiO_2	47.30	27.86
Fe	2.72	3.61
Mn	24.85	32.55
P	.05	.097
S	trace	.030

Iron ore from Shanghai, West Virginia. Analyzed by C. Catlett.

SiO_2	45.24
Fe	26.02
Mn	.43

Two iron ores from Kentucky; analyzed by J. E. Whitfield. A, Cloverport Road, two miles north of Fordsville, Ohio County. B, north slope of Pine Mountain, three miles east of Pineville, Bell County.

	A.	B.
SiO_2	35.67	17.28
TiO_2	trace	trace
Cl	trace	....
SO_3	.42	.40
P_2O_5	1.42	trace
Al_2O_3	6.15	.35
Fe_2O_3	42.31	68.24
FeO	.35	trace
MnO	.84	.95
CaO	1.90	.83
MgO	1.07	.92
Ignition	9.69	11.60
	99.82	100.57
Fe	29.86	47.77
P	.71	....
S	.16	.15

Iron ore. Douglass Mine, Clinton Horizon, one mile west of Big Creek Gap, Campbell County, Tennessee. Analyzed by W. F. Hillebrand.

SiO_2	10.51
Fe	54.29
Mn	.20
P	.355
S	.043

Two iron ores; analyzed by C. Catlett. A, from Edgefield County, South Carolina. B, north part of Howard County, Arkansas.

	A.	B.
SiO_2	9.40	23.10
Fe	52.40	29.57
Mn	trace	2.19
P	.664	.483
S	.08	.04

10. COAL AND COKE.

Three coals. Raccoon Fork of Cabin Creek, Kanawha County, West Virginia. Analyzed by E. L. Howard.

	1.	2.	3.
Moisture	1.93	2.15	1.67
Volatile matter	37.09	23.95	41.36
Fixed carbon	57.90	61.85	53.22
Ash	3.08	12.05	3.75
	100.00	100.00	100.00
Sulphur	.62	.46	.80
Ash	dirty white	light gray	reddish

Coal and coke. Davis Mine No. 1, near North Fork of Blackwater, Tucker County, West Virginia. Analyzed by Charles Catlett.

	Coal.	Coke.
Moisture	.80	.18
Volatile matter	26.84	1.49
Fixed carbon	67.18	90.60
Ash	5.18	7.73
	100.00	100.00
Sulphur	1.68	.771
Ash	very light red	light red

Five coals. Campbell County, Tennessee; A, B, C analyzed by W. F. Hillebrand; D, E by Charles Catlett. A, Douglass Bank, Middle Fork of Big Creek, one and one-half miles from Gap, lower coal-measures. B, Walnut Mountain, head of Hickory Creek, Clear Fork of Cumberland River, 2,850 feet above sea-level, upper coal-measures. C, Middle Fork of Big Creek, lower coal-measures. D, East Fork of Big Creek. E, Middle Fork of Big Creek, three miles from Big Creek Gap.

	A.	B.	C.	D.	E.
Moisture	1.49	2.95	1.11	1.70	7.60
Volatile matter	39.00	38.51	35.59	39.41	34.89
Fixed carbon	53.30	55.42	23.99	55.36	53.14
Ash	6.21	3.12	39.31	3.53	4.37
	100.00	100.00	100.00	100.00	100.00
S	1.53	.87	2.78	1.07	.64
P	.041	....	....	....	....

A rough test on C showed that one ton of coal should yield 40,000 *cubic feet of gas.*

Also two cokes, analyzed by C. Catlett. F, Walnut Mountain, Hickory Creek. G, from Sharp coal, Left Fork of Big Creek.

	F.	G.
Moisture	.20	.50
Volatile matter	2.01	1.95
Fixed carbon	85.56	91.71
Ash	12.23	5.84
	100.00	100.00
S	.886	.705
P	.040	undet.

Thirty-two coals from Gunnison County, Colorado. Collected by G. H. Eldridge, and analyzed by L. G. Eakins.

From Anthracite Creek Mines.

Moisture	3.95
Volatile matter	4.65
Fixed carbon	82.34
Ash	9.06
	100.00
S	.63
P. in ash	.07
Specific gravity	1.644—24.4°

Ash, light red; no coke.

From Green Mountain, Denver Beds.

Moisture	8.91
Volatile matter	46.16
Fixed carbon	44.46
Ash	.47
	100.00
S	.47
Specific gravity	1.381—22.5°

Ash, light red; coke moderately coherent.

From Ohio Creek Mines, Nos. 1 to 11.

	1.	2.	3.	4.	5.
Moisture	7.39	8.46	8.26	1.61	1.34
Volatile matter	39.43	39.01	39.96	13.05	30.25
Fixed carbon	47.83	46.68	46.36	80.29	62.38
Ash	5.35	5.85	5.42	5.05	6.03
	100.00	100.00	100.00	100.00	100.00
S	1.47	.76	.68	.59	.44
P. in ash			.06		.07
Specific gravity	1.328, 23°	1.334, 21.6°	1.331, 25°	1.407, 23°	1.325, 22°
Ash	reddish gray	light red	light red	red	red
Coke	fairly coherent	cokes slightly	cokes slightly	none	firm, solid

	6.	7.	8.	9.	10.	11.
Moisture	6.28	6.37	6.39	1.07	1.23	.81
Volatile matter	40.92	38.06	39.26	26.22	26.65	9.96
Fixed carbon	46.35	49.75	48.41	68.36	68.27	82.33
Ash	6.45	5.82	5.94	4.35	3.85	6.90
	100.00	100.00	100.00	100.00	100.00	100.00
S	.47	.46	.46	.60	.61	1.06
P. in ash			.03	.05		
Specific gravity	1.324, 21°	1.345, 21.6°	1.337, 23°	1.319, 22°	1.317, 22°	1.426, 23.8°
Ash	reddish yellow	reddish yellow	red	red	red	pinkish gray
Coke	fair	slightly coherent	fair	fair	fair	none

From Slate Creek Mines, Nos. 12 to 21.

	12.	13.	14.	15.	16.
Moisture	1.29	1.36	1.86	1.35	1.30
Volatile matter	7.92	7.53	6.68	6.59	7.55
Fixed carbon	85.71	85.49	86.25	72.34	80.44
Ash	5.08	5.62	5.21	19.72	10.71
	100.00	100.00	100.00	100.00	100.00
S	.67	.54	.69	.66	.58
P. in ash		.05	.03		.32
Specific gravity	1.428, 23.4°	1.440, 21.8°	1.465, 26.4°	1.481, 22.2°	1.502, 22.8°
Ash	red	red	red	gray	light red
Coke	none	none	none	none	none

	17.	18.	19.	20.	21.
Moisture	1.58	1.22	1.27	.92	.81
Volatile matter	6.70	8.46	7.99	14.19	13.40
Fixed carbon	87.46	84.20	87.24	81.29	81.26
Ash	4.26	6.12	3.50	3.60	4.53
	100.00	100.00	100.00	100.00	100.00
S	.58	.76	.62	.52	.51
P. in ash				none	
Specific gravity	1.455, 22.8°	1.409, 22°	1.409, 23.3°	1.359, 20.4°	1.371, 20.8°
Ash	red	red	red	light red	red
Coke	none	none	none	cokes slightly	cokes slightly

From Crested Butte Mines, Nos. 22 to 30.

	22.	23.	24.	25.
Moisture	1.36	1.47	1.94	2.36
Volatile matter	37.12	38.09	41.07	40.82
Fixed carbon	57.73	56.68	51.48	50.49
Ash	3.79	3.76	5.51	6.33
	100.00	100.00	100.00	100.00
S	.49	.47	.63	1.04
P. in ash	....	.07	trace	....
Specific gravity	1.288, 22.6°	1.276, 21°	1.311, 21.1°	1.332, 22°
Ash	light red...	light red..	red	red ....
Coke	good.......	good......	good.......	good......

	26.	27.	28.	29.	30.
Moisture	1.88	2.09	1.76	3.95	4.83
Volatile matter	39.51	41.74	42.00	37.17	37.86
Fixed carbon	54.42	52.07	51.97	52.34	51.65
Ash	4.19	4.10	4.27	6.54	5.66
	100.00	100.00	100.00	100.00	100.00
S	.63	.65	.75	.42	.68
P. in ash	....	trace	....	....	....
Specific gravity	1.288, 24.8°	1.289, 26.6°	1.286, 20°	1.328, 22.4°	1.349, 21.2°
Ash	red	red	light red..	red	red ....
Coke	good, solid.	good.......	good......	hard, compact.	fair ....

11. ANALYSES OF WATERS.

Analyzed by T. M. Chatard. A, from the Murray Well, one mile north of Frankfort, Kentucky. Slight odor of H_2S. Specific gravity, .99984, 22°.

	Found, grammes per liter.	Per cent. of total contents.		Combination.
SiO_2	.0096	.61	CO_2	.0172
Fe	.0014	.08	NH_3	.0015
Ca	.0213	1.35	KCl	.0396
Sr?	.0122	.71	NaCl	.8287
Mg	.0189	1.20	Na_2SO_4	.2770
K	.0207	1.31	$FeH_2C_2O_6$	.0045
Na	.4604	29.35	$CaH_2C_2O_6$	.0862
Li	trace	....	$SrH_2C_2O_6$?	.0269
SO_4	.1873	11.93	$MgH_2C_2O_6$	.1150
Cl	.5218	33.23	$NaHCO_3$	.1639
CO_3	.2929	18.74	SiO_2	.0096
CO_2, free	.0172	1.09		
NH_3	.0015	.09		
H, in bicarbonates	.0049	.31		
	1.5701	100.00		1.5701

The strontium is doubtful, and may be only a strong trace.

B, spring water from Mountain City, Tennessee. Statement like the preceding.

	Found.	Per cent. of total.		Combination.
SiO_2	.0219	21.26	SiO_2	.0219
Fe	.0008	.78	$FeH_2C_2O_6$	.0026
Al	trace	....	$CaH_2C_2O_6$	.0448
Ca	.0116	11.26	$MgH_2C_2O_6$	.0110
Mg	.0018	1.75	$CaSO_4$	.0018
Na	.0046	4.47	Na_2SO_4	.0142
K	.0032	3.11	K_2SO_4	.0042
Cl	.0012	1.16	KCl	.0025
SO_4	.0132	12.81		
CO_3	.0440	42.72		
H, bicarbonates	.0007	.68		
	.1030	100.00		.1030

C, the Grace Spring, seven miles north of Mountain City, Tennessee, on the road to Abingdon, Virginia, near Laurel Bloomery post-office. Specific gravity, 1.00038, 18.5°.

	Found.	Per cent. of total.		Combination.
SiO_2	.0125	1.09	SiO_2	.0125
Fe	trace	....	KCl	.0023
Ca	.2334	20.31	K_2SO_4	.0075
Mg	.0580	5.05	Na_2SO_4	.0145
K	.0046	.40	$MgSO_4$	.2900
Na	.0047	.41	$CaSO_4$	.6429
Cl	.0011	.09	$CaH_2C_2O_6$	.1794
SO_4	.6997	60.89		
CO_3	.1329	11.57		
H, bicarbonates	.0022	.19		
	1.1491	100.00		1.1491

D, drinking water, Savannah, Georgia. Stated in grammes per liter.

	Found.		Combination.
Suspended matter (organic)	.0020	Suspended matter	.0025
Suspended matter (inorganic)	.0005	SiO_2	.0624
SiO_2	.0624	Al_2O_3, Fe_2O_3	.0006
Al_2O_3, Fe_2O_3	.0006	NaCl	.0097
Ca	.0279	Na_2SO_4	.0120
Mg	.0085	$CaH_2C_2O_6$	.1129
Na	.0075	$MgH_2C_2O_6$	.0517
Cl	.0061		
SO_4	.0081		
CO_3	.1262		
NH_3, free	trace		
NH_3, albuminoid	none		
H, bicarbonates	.0020		
	.2518		.2518

E, two artesian well waters from St. Augustine, Florida. (*a*) six-inch well.

	Found.	Per cent. of total.		Combination.
Suspended matter	.0037	.24	Suspended matter	.0037
SiO_2	.0224	1.43	SiO_2	.0224
Al_2O_3	.0005	.03	Al_2O_3	.0005
Ca	.1276	8.16	NaCl	.6979
Mg	.0726	4.64	KCl	.0281
Sr	.0081	.52	$MgCl_2$	.1470
Na	.2743	17.54	$SrSO_4$	.0170
K	.0147	.94	$CaSO_4$	.4338
Cl	.5469	34.97	$MgSO_4$	.0127
SO_4	.3253	20.81	$MgH_2C_2O_6$	.2007
CO_3	.1650	10.55	$CaH_2C_2O_6$	none.
H, bicarbonates	.0027	.17		
	1.5638	100.00		1.5638

(*b*) twelve-inch well.

	Found.	Per cent. of total.		Combination.
Suspended matter	.0016	.05	Suspended matter	.0016
SiO_2	.0280	.88	SiO_2	.0280
Al_2O_3	.0012	.04	Al_2O_3	.0012
Ca	.1755	5.50	NaCl	1.9577
Mg	.1160	3.64	KCl	.0475
Sr	.0089	.28	$MgCl_2$	.3534
Na	.7695	24.12	$SrSO_4$	.0186
K	.0248	.77	$CaSO_4$	.4709
Cl	1.4750	46.22	$MgSO_4$	none.
SO_4	.3421	10.73	$MgH_2C_2O_6$	.1621
CO_3	.2442	7.64	$CaH_2C_2O_6$	.1499
H, bicarbonates	.0041	.13		
	3.1909	100.00		3.1909

F, from well four miles northwest of Clinton, Hinds County, Mississippi. No carbonates present.

	Found.	Per cent. of total.		Combination.
Suspended matter	.0028	.18	Suspended matter	.0028
SiO_2	.0750	4.82	SiO_2	.0750
Al_2O_3	.0077	.49	Al_2O_3	.0077
Fe_2O_3	trace.	....	$Al_2(SO_4)_3$	.0504
Al in sulphate	.0081	.52	$MnSO_4$	.0028
Mn	.0010	.06	$CaSO_4$	.6732
Ca	.1980	12.72	$MgSO_4$	.3695
Mg	.0739	4.78	Na_2SO_4	.2519
Na	.1234	7.92	NaCl	.1063
K	.0088	.56	KCl	.0167
SO_4	.9852	63.30		
Cl	.0724	4.65		
	1.5563	100.00		1.5563

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